

TSG-RAN Meeting #13
Beijing, China, 18 - 21, September, 2001

TSGRP#13(01) 0594

Title: Agreed CRs to TS 25.413

Source: TSG-RAN WG3

Agenda item: 8.3.3/8.3.4/9.4.3

RP Tdoc	R3 Tdoc	Spec	CR_Num	Rev	Release	CR_Subject	Cat	Cur_Ver	New_Ver	Workitem
RP-010594	R3-012098	25.413	244	6	Rel-4	N-to-M relation between CN and UTRAN	F	4.1.0	4.2.0	TrFO
RP-010594	R3-012093	25.413	297	2	Rel-4	Clarification on User Plane Version Indication	F	4.1.0	4.2.0	TrFO
RP-010594	R3-012626	25.413	302	7	Rel-4	Release 4 additions in lu to support new positioning methods	F	4.1.0	4.2.0	TEI

CHANGE REQUEST

⌘ **25.413** **CR 244** ⌘ rev **6** ⌘ Current version: **4.1.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title:	⌘ N-to-M relation between CN and UTRAN		
Source:	⌘ R-WG3		
Work item code:	⌘ TrFO	Date:	⌘ 2001-08-13
Category:	⌘ F	Release:	⌘ REL-4
<i>Use one of the following categories:</i>		<i>Use one of the following releases:</i>	
F (essential correction)		2 (GSM Phase 2)	
A (corresponds to a correction in an earlier release)		R96 (Release 1996)	
B (Addition of feature),		R97 (Release 1997)	
C (Functional modification of feature)		R98 (Release 1998)	
D (Editorial modification)		R99 (Release 1999)	
Detailed explanations of the above categories can be found in 3GPP TR 21.900.		REL-4 (Release 4)	
		REL-5 (Release 5)	

Reason for change: ⌘ The TSG SA#11 approved version of 23.221 (Architecture requirements for Rel-4) includes the following statement:
“Alternatively, in the case of intra-PLMN handover, the GSM to UMTS inter-system handover or SRNS relocation between two MSC-areas may be executed as intra-MSC inter-system handover or SRNS relocation respectively. In such a case this will be performed by utilising a direct SCCP connection between the target RNC located in the target MSC-area and the MSC server already involved in the call.”

CN4 has also in a LS indicated that this option will be used for the handling of TrFO calls during SRNS relocation, and asked RAN3 to provide the necessary support for the option.

The RANAP in a target RNC, implemented according to the current REL-4 version of the 25.413, will not notice if a Relocation Request message arrives from another CN node than its “default” CN node, since the signalling connection between the CN and target RNC is just established towards the CN node that sent the Relocation Request message. This message also contains the necessary user plane information that allows the RNC to establish the user plane transport to the CN node.

The normal operation of this optional feature is thus already supported by the current RANAP specification, but any connectionless messages sent by the “foreign” CN node will fail since the RNC will assume that they came from its “default” CN node.

The connectionless messages from other CN nodes than the “default” CN node must include an identification of the sending CN node in order to make it possible for the RNC to send the reply to the correct CN node.

In order to have unique lu Signalling connection identifiers (For the Reset Resource procedure) when they can be assigned by different CN nodes, the lu

		Signalling connection identifiers need to be related to the assigning CN node.												
Summary of change:	⌘	The connectionless RANAP messages need a new parameter in order to identify the sending CN node (when other than the "default" CN node). lu signalling connection handling in RNC will have to consider from which CN node it has received the lu Signalling connection identifier. This affects the Reset Resource procedures as well.												
Consequences if not approved:	⌘	If the CN chooses to use the alternative procedure for SRNS relocation between two MSC-areas, then connectionless procedures (in error situations) and the Reset Resource procedure will not work. The proposed ASN.1 changes are introduced in a backwards compatible way. The proposed changes will only affect nodes that chooses to implement the option.												
Clauses affected:	⌘	3.1, 8.7.2, 8.22.1, 8.25.3.1, 8.25.3.2, 8.26.2.1, 8.26.2.2, 8.27.2, 8.29.2.2, 9.1.10, 9.1.39, 9.1.40, 9.1.41, 9.1.44, 9.2.1.xx, 9.3.3, 9.3.4, 9.3.6												
Other specs affected:	⌘	<table border="1"> <tr> <td><input checked="" type="checkbox"/></td> <td>Other core specifications</td> <td>⌘</td> <td>25.410 v4.1.0 CR009</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Test specifications</td> <td></td> <td></td> </tr> <tr> <td><input type="checkbox"/></td> <td>O&M Specifications</td> <td></td> <td></td> </tr> </table>	<input checked="" type="checkbox"/>	Other core specifications	⌘	25.410 v4.1.0 CR009	<input type="checkbox"/>	Test specifications			<input type="checkbox"/>	O&M Specifications		
<input checked="" type="checkbox"/>	Other core specifications	⌘	25.410 v4.1.0 CR009											
<input type="checkbox"/>	Test specifications													
<input type="checkbox"/>	O&M Specifications													
Other comments:	⌘	Add a definition of the Global CN Id to 23.003 and when that is done also references from 25.401 and 25.413 to this definition in 23.003.												

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

- 1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under <ftp://www.3gpp.org/specs/> For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.
- 3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

Default CN node: An RNC has one single permanent default CN node per CN domain. It always initiates the Initial UE Message procedure towards its default CN node.

Relocation of SRNS: relocation of SRNS is a UMTS functionality used to relocate the serving RNS role from one RNS to another RNS. This UMTS functionality is realised by several elementary procedures executed in several interfaces and by several protocols and it may involve a change in the radio resources used between UTRAN and UE

It is also possible to relocate the serving RNS role from:

- one RNS within UMTS to another relocation target external to UMTS;
- functionality equivalent to the serving RNS role from another relocation source external to UMTS to another RNS.

Serving RNS (SRNS): role an RNS can take with respect to a specific connection between an UE and UTRAN. There is one serving RNS for each UE that has a connection to UTRAN. The serving RNS is in charge of the radio connection between a UE and the UTRAN. The serving RNS terminates the Iu for this UE

Serving RNC (SRNC): SRNC is the RNC belonging to SRNS

SRNC-ID: see [3] for definition

S-RNTI: see [3] for definition

Source RNS: role, with respect to a specific connection between UTRAN and CN, that RNS takes when it decides to initiate a relocation of SRNS

Source RNC: source RNC is the RNC belonging to source RNS

Target RNS: role an RNS gets with respect to a specific connection between UTRAN and CN when it is being a subject of a relocation of SRNS which is being made towards that RNS

Target RNC: target RNC is the RNC belonging to target RNS

Directed retry: Directed retry is the process of assigning a User Equipment to a radio resource that does not belong to the serving RNC e.g. in situations of congestion. It is triggered by the RAB Assignment procedure and employs relocation procedures.

Elementary Procedure: RANAP protocol consists of Elementary Procedures (EPs). An Elementary Procedure is a unit of interaction between the RNS and the CN. These Elementary Procedures are defined separately and are intended to be used to build up complete sequences in a flexible manner. If the independence between some EPs is restricted, it is described under the relevant EP description. Unless otherwise stated by the restrictions, the EPs may be invoked independently of each other as stand alone procedures, which can be active in parallel. Examples on using several RANAP EPs together with each other and EPs from other interfaces can be found in reference [4].

An EP consists of an initiating message and possibly a response message. Three kinds of EPs are used:

- **Class 1:** Elementary Procedures with response (success and/or failure).
- **Class 2:** Elementary Procedures without response.
- **Class 3:** Elementary Procedures with possibility of multiple responses.

For Class 1 EPs, the types of responses can be as follows:

Successful:

- A signalling message explicitly indicates that the elementary procedure successfully completed with the receipt of the response.

Unsuccessful:

- A signalling message explicitly indicates that the EP failed.
- On time supervision expiry (i.e. absence of expected response).

Successful and Unsuccessful:

- One signalling message reports both successful and unsuccessful outcome for the different included requests. The response message used is the one defined for successful outcome.

Class 2 EPs are considered always successful.

Class 3 EPs have one or several response messages reporting both successful, unsuccessful outcome of the requests and temporary status information about the requests. This type of EP only terminates through response(s) or EP timer expiry.

8.7 Relocation Resource Allocation

8.7.1 General

The purpose of the Relocation Resource Allocation procedure is to allocate resources from target RNS for a relocation of SRNS. Procedure shall be co-ordinated in all Iu signalling connections existing for the UE. The procedure uses connection oriented signalling.

8.7.2 Successful Operation

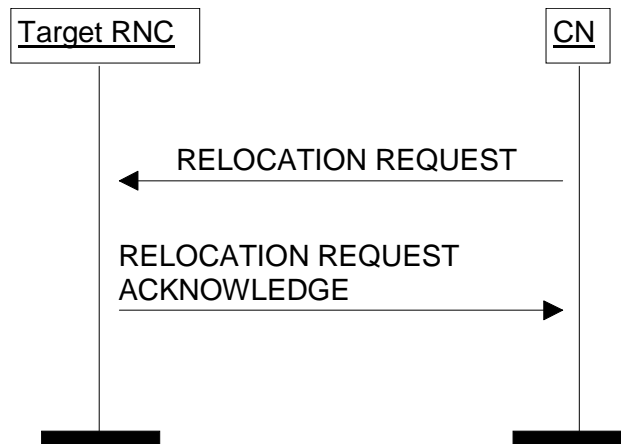


Figure 1: Relocation Resource Allocation procedure. Successful operation.

The CN shall initiate the procedure by generating RELOCATION REQUEST message. In a UTRAN to UTRAN relocation, this message shall contain the information (if any) required by the UTRAN to build the same RAB configuration as existing for the UE before the relocation. The CN may indicate that RAB QoS negotiation is allowed for certain RAB parameters and in some cases also which alternative values to be used in the negotiation.

The CN shall transmit the RELOCATION REQUEST message to target RNC and the CN shall start the timer $T_{RELOCalloc}$.

When a RELOCATION REQUEST message is sent from a CN node towards an RNC for which the sending CN node is not the default CN node, the *Global CN-ID* IE shall be included.

Upon reception of the RELOCATION REQUEST message, the target RNC shall initiate allocation of requested resources. The following information elements received in RELOCATION REQUEST message require the same special actions in the RNC as specified for the same IEs in the RAB Assignment procedure:

- RAB-ID
- User plane mode
- Priority level, queuing and pre-emption indication
- Service Handover

If the RELOCATION REQUEST message includes the *PDP Type Information* IE, the UTRAN may use this to configure any compression algorithms.

The *Cause* IE shall contain the same value as the one received in the related RELOCATION REQUIRED message.

The *Iu Signalling Connection Identifier* IE contains an Iu signalling connection identifier which is allocated by the CN, and which the RNC is required to store and remember for the duration of the Iu connection.

The *Global CN-ID* IE contains the identity of the CN node that sent the RELOCATION REQUEST message, and it shall, if included, be stored together with the Iu signalling connection identifier. If the *Global CN-ID* IE is not included,

the RELOCATION REQUEST message shall be considered as coming from the default CN node for the indicated CN domain.

Following additional actions shall be executed in the target RNC during Relocation Resource Allocation procedure:

If the relocation type is "UE involved in relocation of SRNS":

- The target RNC may accept a requested RAB only if the RAB can be supported by the target RNC.
- Other RABs shall be rejected by the target RNC in the RELOCATION REQUEST ACKNOWLEDGE message with an appropriate value for *Cause IE*, e.g. "Unable to Establish During Relocation".
- The target RNC shall include information adapted to the resulting RAB configuration in the target to source RNC transparent container to be included in the RELOCATION REQUEST ACKNOWLEDGE message sent to the CN. If the target RNC supports triggering of the Relocation Detect procedure via the Iur interface, the RNC shall assign a d-RNTI for the context of the relocation and include it in the container. If two CNs are involved in the relocation of SRNS, the target RNC may, however, decide to send the container to only one CN.
- If any alternative RAB parameter values have been used when allocating the resources, these RAB parameter values shall be included in the RELOCATION REQUEST ACKNOWLEDGE message.

If the relocation type IE is "UE not involved in relocation of SRNS":

- The target RNC may accept a RAB only if the radio bearer(s) for the RAB either exist(s) already, and can be used for the RAB by the target RNC, or does not exist before the relocation but can be established in order to support the RAB in the target RNC.
- If existing radio bearers are not related to any RAB that is accepted by target RNC, the radio bearers shall be ignored during the relocation of SRNS and the radio bearers shall be released by radio interface protocols after completion of relocation of SRNS.
- If any alternative RAB parameter values have been used when allocating the resources, these RAB parameter values shall be included in the RELOCATION REQUEST ACKNOWLEDGE message. It should be noted that the usage of alternative RAB parameter values is not applicable to the UTRAN initiated relocation of type "UE not involved in relocation of SRNS".

After all necessary resources for accepted RABs including the initialised Iu user plane, are successfully allocated, the target RNC shall send RELOCATION REQUEST ACKNOWLEDGE message to the CN. The resources associated with the RABs indicated as failed to set up shall not be released in the CN until the relocation is completed. This is in order to make a return to the old configuration possible in case of a failed or cancelled relocation.

The RELOCATION REQUEST ACKNOWLEDGE message received by the CN may optionally contain a transparent container, which shall be transferred by CN to the source RNC or the external relocation source while completing the Relocation Preparation procedure.

If one or more of the RABs that the target RNC has decided to support can not be supported by the CN, then these failed RABs shall not be released towards the target RNC until the relocation is completed.

If the *NAS Synchronisation Indicator IE* is contained in the RELOCATION REQUEST message, the target RNC shall pass it to the source RNC within the *RRC Container IE* contained in the *Target RNC to Source RNC Transparent Container IE*.

Transmission and reception of RELOCATION REQUEST ACKNOWLEDGE message terminates the procedure in the UTRAN and the CN respectively.

Before reporting the successful outcome of the Relocation Resource allocation procedure, the RNC shall have executed the initialisation of the user plane mode as requested by the CN in the *User Plane Mode IE*. If the RNC is requested to execute the user plane initialisation for the *User Plane Mode* "support mode for predefined SDU sizes", it shall initialise all RAB subflow combinations on Iu as indicated in the *RAB parameters IE*. If not all of the indicated RAB subflow combinations can be initialised the RAB Assignment fails with the cause value "RNC unable to establish all RFCs". The user plane initialisation is described in ref.[6].

8.22 Initial UE Message

8.22.1 General

The purpose of the Initial UE Message procedure is to establish an Iu signalling connection between a CN domain and the RNC and to transfer the initial NAS-PDU to the default CN node. The procedure uses connection oriented signalling.

8.22.2 Successful Operation

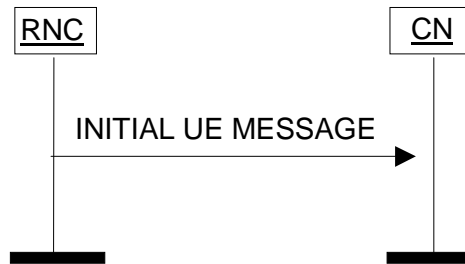


Figure 2: Initial UE Message procedure. Successful operation.

When RNC has received from radio interface a NAS message (see ref. [8]) to be forwarded to CN domain to which the Iu signalling connection for the UE does not exist, RNC shall initiate the Initial UE Message procedure and send the INITIAL UE MESSAGE message to the CN.

In addition to the received NAS-PDU, RNC shall add following information to the INITIAL UE MESSAGE message:

- CN domain indicator, indicating the CN domain towards which this message is sent.
- For CS domain, the LAI which was the last LAI indicated to the UE by UTRAN via the current RRC connection, or if UTRAN had not yet indicated any LAI to the UE via the current RRC connection, then the LAI of the cell via which the current RRC connection was established.
- For PS domain, the LAI+RAC which were the last LAI+RAC indicated to the UE by UTRAN via the current RRC connection, or if UTRAN had not yet indicated any LAI+RAC to the UE via the current RRC connection, then the LAI+RAC of the cell via which the current RRC connection was established.
- Service Area corresponding to at least one of the cells from which the UE is consuming radio resources.
- Iu signalling connection identifier.
- Global RNC identifier.

The *Iu Signalling Connection Identifier* IE contains an Iu signalling connection identifier which is allocated by the RNC, and which the CN is required to store and remember for the duration of the Iu connection.

Whereas several processing entities within the CN (e.g. charging, interception, etc.) may make use of the location information given in the *SAI* IE and the *LAI* (and *RAC*) IE, the mobility management within the CN shall rely on the information given within the *LAI* IE (resp. *LAI* and *RAC* IEs) only.

8.25 Overload Control

8.25.1 General

This procedure is defined to give some degree of signalling flow control. At the UTRAN "Processor Overload" and "Overload in the Capability to Send Signalling Messages to the UE" are catered for, and at the CN "Processor Overload" is catered for. The procedure uses connectionless signalling.

The philosophy used is to stem the traffic at source with known effect on the service. The algorithm used is:

At the CN side:

- If T_{igOC} is not running and an OVERLOAD message or "Signalling Point Congested" information is received, the traffic should be reduced by one step. It is also possible, optionally, to indicate the number of steps to reduce the traffic. At the same time, timers T_{igOC} and T_{inTC} should be started.
- During T_{igOC} all received OVERLOAD messages or "Signalling Point Congested" information should be ignored.
- This step by step reduction of traffic should be continued until maximum reduction is obtained by arriving at the last step.
- If T_{inTC} expires (i.e. no OVERLOAD message or "Signalling Point Congested" information is received during T_{inTC}) the traffic should be increased by one step and T_{inTC} should be started unless normal load has been resumed.

At the UTRAN side:

- If T_{igOR} is not running and an OVERLOAD message or "Signalling Point Congested" information is received, the traffic should be reduced by one step. It is also possible, optionally, to indicate the number of steps to reduce the traffic. At the same time, timers T_{igOR} and T_{inTR} should be started.
- During T_{igOR} all received OVERLOAD messages or "Signalling Point Congested" information should be ignored.
- This step-by-step reduction of traffic should be continued until maximum reduction is obtained by arriving at the last step.
- If T_{inTR} expires (i.e. no OVERLOAD message or "Signalling Point Congested" information is received during T_{inTR}) the traffic should be increased by one step and T_{inTR} should be started unless normal load has been resumed.

The number of steps and the method of reducing the load are considered to be an implementation specific function.

There may be other traffic control mechanisms from O&M activities occurring simultaneously.

8.25.2 Philosophy

Void

8.25.3 Successful Operation

8.25.3.1 Overload at the CN



Figure 3: Overload at the CN. Successful operation.

The CN should indicate to the RNC that it is in a congested state by sending an OVERLOAD message. The *CN Domain Indicator* IE may be included, if the CN can determine the domain suffering the signalling traffic overload. A specific CN node shall send this message only towards those RNCs for which it is default CN node.

The UTRAN receipt of this message should cause the reduction of signalling traffic towards the CN. If *CN Domain Indicator* IE is indicated within the OVERLOAD message, the RNC should apply signalling traffic reduction mechanisms to the indicated domain

8.25.3.2 Overload at the UTRAN



Figure 4: Overload at the UTRAN. Successful operation.

If the UTRAN is not capable to send signalling messages to the UE due to overloaded resources then the UTRAN should send an OVERLOAD message to the CN. A specific RNC shall send this message only towards its default CN node of the concerned domain(s).

8.25.4 Abnormal Conditions

Not applicable.

8.26 Reset

8.26.1 General

The purpose of the Reset procedure is to initialise the UTRAN in the event of a failure in the CN or vice versa. The procedure uses connectionless signalling.

8.26.2 Successful Operation

8.26.2.1 Reset Procedure Initiated from the CN

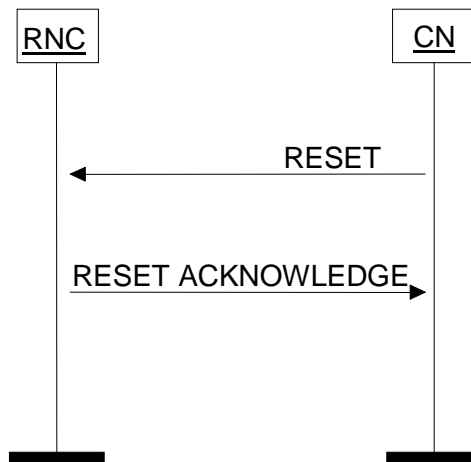


Figure 5: Reset procedure initiated from the CN. Successful operation.

In the event of a failure at the CN, which has resulted in the loss of transaction reference information, a RESET message shall be sent to the RNC. When a CN node sends this message towards an RNC for which it is not the default CN node, the Global CN-ID IE shall be included. This message is used by the UTRAN to release affected Radio Access Bearers and to erase all affected references for the specific CN node that sent the RESET message, i.e. the CN node indicated by the Global CN-ID IE or, if this IE is not included, the default CN node for the indicated CN domain.

After a guard period of T_{RatC} seconds a RESET ACKNOWLEDGE message shall be returned to the CN, indicating that all UEs which were involved in a call are no longer transmitting and that all references at the UTRAN have been cleared.

Interactions with other procedures:

In case of interactions with other procedures, the Reset procedure shall always override all other procedures.

8.26.2.2 Reset Procedure Initiated from the UTRAN

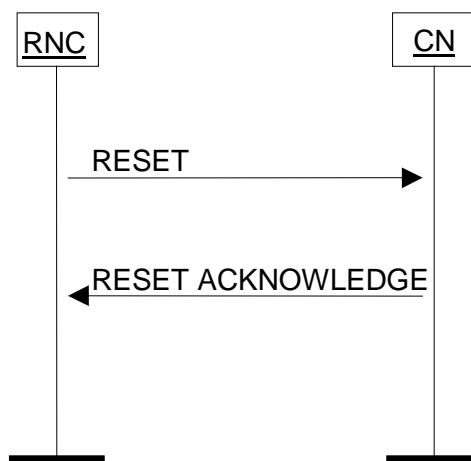


Figure 6: Reset procedure initiated from the UTRAN. Successful operation.

In the event of a failure at the UTRAN which has resulted in the loss of transaction reference information, a RESET message shall be sent to all the CN nodes towards which the RNC has Iu signalling connections established. This message is used by the CN to release affected Radio Access Bearers and to erase all affected references for the sending RNC.

After a guard period of T_{RafR} seconds a RESET ACKNOWLEDGE message shall be returned to the UTRAN indicating that all references have been cleared.

When a RESET ACKNOWLEDGE message is sent from a CN node towards an RNC for which the sending CN node is not the default CN node, the *Global CN-ID* IE shall be included.

Interactions with other procedures:

In case of interactions with other procedures, the Reset procedure shall always override all other procedures.

8.26.3 Abnormal Conditions

8.26.3.1 Abnormal Condition at the CN

If the CN sends a RESET message to the RNC and receives no RESET ACKNOWLEDGE message within a period T_{RafR} then it shall repeat the entire Reset procedure. The sending of the RESET message shall be repeated a maximum of "n" times where n is an operator matter. After the n-th unsuccessful repetition the procedure shall be stopped and e.g. the maintenance system be informed.

8.26.3.2 Abnormal Condition at the UTRAN

If the RNC sends a RESET message to the CN and receives no RESET ACKNOWLEDGE message within a period T_{RafC} then it shall repeat the entire Reset procedure. The sending of the RESET message shall be repeated a maximum of "n" times where n is an operator matter. After the n-th unsuccessful repetition the procedure shall be stopped and e.g. the maintenance system be informed.

8.26.3.3 Crossing of Reset Messages

When an entity that has sent a RESET message and is waiting for a RESET ACKNOWLEDGE message, instead receives a RESET message from the peer entity, it shall stop timer T_{RafC} or T_{RafR} and send a RESET ACKNOWLEDGE message to the peer entity.

8.27 Error Indication

8.27.1 General

The Error Indication procedure is initiated by a node to report detected errors in one incoming message, provided they cannot be reported by an appropriate failure message.

If the error situation arises due to reception of a message utilising dedicated signalling, then the Error Indication procedure uses connection oriented signalling. Otherwise the procedure uses connectionless signalling.

8.27.2 Successful Operation



Figure 7: Error Indication procedure, CN originated. Successful operation.



Figure 8: Error Indication procedure, RNC originated. Successful operation.

When the conditions defined in chapter 10 are fulfilled, the Error Indication procedure is initiated by an ERROR INDICATION message sent from the receiving node.

Examples for possible cause values for protocol error indications are:

- "Transfer Syntax Error".
- "Semantic Error".
- "Message not compatible with receiver state".

When an ERROR INDICATION message is sent connectionless from a CN node towards an RNC for which the sending CN node is not the default CN node, the *Global CN-ID* IE shall be included.

8.27.3 Abnormal Conditions

Not applicable.

8.29 Reset Resource

8.29.1 General

The purpose of the Reset Resource procedure is to initialise part of the UTRAN in the event of an abnormal failure in the CN or vice versa (e.g. Signalling Transport processor reset). The procedure uses connectionless signalling.

8.29.1.1 Reset Resource procedure initiated from the RNC

Void

8.29.1.2 Reset Resource procedure initiated from the CN

void

8.29.2 Successful Operation

8.29.2.1 Reset Resource procedure initiated from the RNC

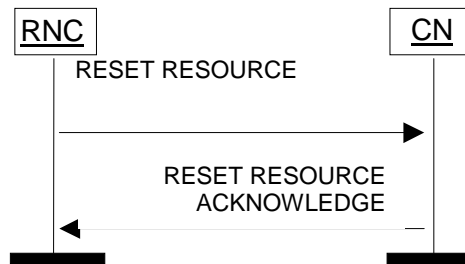


Figure 9: RNC initiated Reset Resource procedure. Successful operation.

The RNC initiates this procedure by sending a RESET RESOURCE message to the CN.

The RESET RESOURCE message shall include a *Cause* IE with appropriate cause value (e.g. "Signalling Transport Resource Failure").

On reception of this message the CN shall release locally the resources and references (i.e. resources and Iu signalling connection identifiers) associated to the Iu signalling connection identifiers indicated in the received message. The CN shall always return the RESET RESOURCE ACKNOWLEDGE message to the RNC when all Iu-related resources and references have been released. The list of Iu signalling connection identifiers within the RESET RESOURCE ACKNOWLEDGE message shall be in the same order as received in the RESET RESOURCE message. Unknown signalling connection identifiers shall be reported as released.

When a RESET RESOURCE ACKNOWLEDGE message is sent from a CN node towards an RNC for which the sending CN node is not the default CN node, the *Global CN-ID* IE shall be included.

Both CN and RNC shall provide means to prevent the immediate re-assignment of released Iu signalling connection identifiers to minimise the risk that the Reset Resource procedure releases the same Iu signalling connection identifiers re-assigned to new Iu connections.

8.29.2.2 Reset Resource procedure initiated from the CN

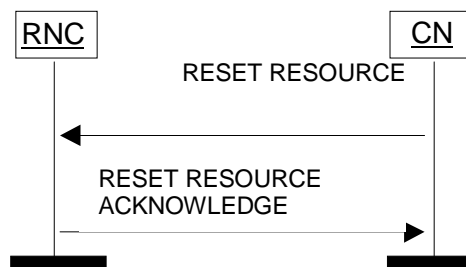


Figure 10: CN initiated Reset Resource procedure. Successful operation.

The CN initiates this procedure by sending a RESET RESOURCE message to the RNC.

The RESET RESOURCE message shall include a *Cause* IE with appropriate cause value (e.g. "Signalling Transport Resource Failure").

When a RESET RESOURCE message is sent from a CN node towards an RNC for which the sending CN node is not the default CN node, the *Global CN-ID* IE shall be included.

On reception of this message the RNC shall release locally the resources and references (i.e. radio resources and Iu signalling connection identifiers) associated to the specific CN node and Iu signalling connection identifiers indicated in the received message. If no *Global CN-ID* IE is included in the RESET RESOURCE message to indicate the sending CN node, the default CN node for the indicated CN domain shall be considered as sender. The RNC shall always return the RESET RESOURCE ACKNOWLEDGE message to the CN when all Iu-related resources and references have been released. The list of Iu signalling connection identifiers within the RESET RESOURCE ACKNOWLEDGE message shall be in the same order as received in the RESET RESOURCE message. Unknown signalling connection identifiers shall be reported as released.

Both RNC and CN shall provide means to prevent the immediate re-assignment of released Iu signalling connection identifiers to minimise the risk that the Reset Resource procedure releases the same Iu signalling connection identifiers re-assigned to new Iu connections.

9.1.10 RELOCATION REQUEST

This message is sent by the CN to request the target RNC to allocate necessary resources for a relocation.

Direction: CN → RNC.

Signalling bearer mode: Connection oriented.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
Permanent NAS UE Identity	C – ifAvail		9.2.3.1		YES	ignore
Cause	M		9.2.1.4		YES	ignore
CN Domain Indicator	M		9.2.1.5		YES	reject
Source RNC To Target RNC Transparent Container	M		9.2.1.28		YES	reject
RABs To Be Setup List	O				YES	reject
>RABs To Be Setup Item IEs		1 to <maxnoofRABs>			EACH	reject
>>RAB ID	M		9.2.1.2		-	
>>NAS Synchronisation Indicator	C – ifNASInfoProvided		9.2.3.18		-	
>>RAB Parameters	M		9.2.1.3		-	
>>Data Volume Reporting Indication	C – ifPS		9.2.1.17		-	
>> PDP Type Information	C – ifPS		9.2.1.40		-	
>>User Plane Information	M				-	
>>>User Plane Mode	M		9.2.1.18		-	
>>>UP Mode Versions	M		9.2.1.19		-	
>>Transport Layer Address	M		9.2.2.1		-	
>>lu Transport Association	M		9.2.2.2		-	
>>Service Handover	O		9.2.1.41		-	
>> Alternative RAB Parameter Values	O		9.2.1.43		Yes	ignore
Integrity Protection Information	C – ifAvail		9.2.1.11	Integrity Protection Information includes key and permitted algorithms.	YES	ignore
Encryption Information	O		9.2.1.12	Encryption Information includes key and permitted algorithms.	YES	ignore
lu Signalling Connection Identifier	M		9.2.1.38		YES	ignore
<u>Global CN-ID</u>	<u>O</u>		<u>9.2.1.xx</u>		<u>YES</u>	<u>reject</u>

Condition	Explanation
IfAvail	This IE is only present if available at the sending side.
IfPS	This IE is only present for RABs towards the PS domain.
IfNASInfoProvided	This IE is present if the relevant NAS information is provided by the CN.

Range bound	Explanation
maxnoofRABs	Maximum no. of RABs for one UE. Value is 256.

9.1.39 RESET

This message is sent by both the CN and the RNC and is used to request that the other node shall be reset.

Direction: RNC → CN and CN → RNC.

Signalling bearer mode: Connectionless.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
Cause	M		9.2.1.4		YES	ignore
CN Domain Indicator	M		9.2.1.5		YES	reject
Global RNC-ID	C - ifUL		9.2.1.39		YES	ignore
Global CN-ID	O		9.2.1.xx		YES	ignore

Condition	Explanation
IfUL	This IE is always used in uplink direction

9.1.40 RESET ACKNOWLEDGE

This message is sent by both the CN and the RNC as a response to RESET message.

Direction: RNC → CN and CN → RNC.

Signalling bearer mode: Connectionless.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
CN Domain Indicator	M		9.2.1.5		YES	reject
Criticality Diagnostics	O		9.2.1.35		YES	ignore
Global RNC-ID	C - ifUL		9.2.1.39		YES	ignore
Global CN-ID	O		9.2.1.xx		YES	ignore

Condition	Explanation
IfUL	This IE is always used in uplink direction

9.1.41 ERROR INDICATION

This message is sent by both the CN and the RNC and is used to indicate that some error has been detected in the node.

Direction: RNC → CN and CN → RNC.

Signalling bearer mode: Connection oriented or connectionless.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	ignore
Cause	C - ifalone		9.2.1.4		YES	ignore
Criticality Diagnostics	C - ifalone		9.2.1.35		YES	ignore
CN Domain Indicator	C - ifCL		9.2.1.5		YES	ignore
Global RNC-ID	C - ifULandCL		9.2.1.39		YES	ignore
Global CN-ID	O		9.2.1.xx		YES	ignore

Condition	Explanation
ifalone	At least either Cause IE or Criticality Diagnostics IE shall be present.
ifULandCL	This IE is always used in uplink direction when message is sent connectionless
ifCL	This IE is always used when the message is sent connectionless

9.1.44 RESET RESOURCE

This message is sent by either CN or RNC. The sending entity informs the receiving entity that the sending requests the receiving entity to release resources and references associated to Iu signalling connection identifiers in the message.

Direction: CN \leftarrow \rightarrow RNC.

Signalling bearer mode: Connectionless.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
CN Domain Indicator	M		9.2.1.5		YES	reject
Cause	M		9.2.1.4		YES	ignore
Reset Resource List	M				YES	reject
>Reset Resource Item IEs		1 to <maxnoofluSigConIds>			EACH	reject
>>Iu Signalling Connection Identifier	M		9.2.1.38		-	
Global RNC-ID	C - ifUL		9.2.1.39		YES	ignore
Global CN-ID	O		9.2.1.xx		YES	ignore

Condition	Explanation
IfUL	This IE is always used in uplink direction

Range bound	Explanation
maxnoofluSigConIds	Maximum no. of Iu signalling connection identifiers. Value is 250.

9.1.45 RESET RESOURCE ACKNOWLEDGE

This message is sent by either the CN or RNC inform the CN or RNC that the RESET RESOURCE message has been received.

Direction: CN \leftarrow \rightarrow RNC.

Signalling bearer mode: Connectionless.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
CN Domain Indicator	M		9.2.1.5		YES	reject
Reset Resource List	M				YES	reject
>Reset Resource Item IEs		1 to <maxnoofluSigConIds>		This list shall be in the same order as the list received in the RESET RESOURCE message.	EACH	reject
>>Iu Signalling Connection Identifier	M		9.2.1.38		-	
Global RNC-ID	C - ifUL		9.2.1.39		YES	ignore
Criticality Diagnostics	O		9.2.1.35		YES	ignore
Global CN-ID	O		9.2.1.xx		YES	ignore

Condition	Explanation
IfUL	This IE is always used in uplink direction

Range bound	Explanation
maxnoofluSigConlds	Maximum no. of lu signalling connection identifiers. Value is 250.

9.2.1.45 Requested RAB Parameter Values

The purpose of *Requested RAB Parameter Values* IE is to indicate the RAB parameters for which different values are being requested, as well as those different RAB parameter values.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Requested RAB Parameter Values				
>Requested Maximum Bit Rate	C - ifReNegReq	0 to <nbr-SeparateTrafficDirections>	INTEGER (1..16,000,000)	When nbr-SeparateTrafficDirections is equal to 2, Requested Maximum Bit Rate attribute for downlink is signalled first, then Requested Maximum Bit Rate attribute for uplink.
>Requested Guaranteed Bit Rate	C - ifReNegReq	0 to <nbr-SeparateTrafficDirections>	INTEGER (0..16,000,000)	When nbr-SeparateTrafficDirections is equal to 2, Requested Guaranteed Bit Rate for downlink is signalled first, then Requested Guaranteed Bit Rate for uplink.

Range bound	Explanation
nbr-SeparateTrafficDirection	Number of Traffic Directions being signalled separately. Set to 2 if RAB Asymmetry Indicator is asymmetric bidirectional. Set to 1 in all other cases.

Condition	Explanation
ifReNegReq	This IE is only present when a different value is being requested for the RAB parameter.

9.2.1.xx Global CN-ID

Global CN-ID is used to globally identify a CN node.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Global CN-ID				
>PLMN identity	M		OCTET STRING (SIZE (3))	<ul style="list-style-type: none"> - digits 0 to 9, two digits per octet. - each digit encoded 0000 to 1001. - 1111 used as filler - bit 4 to 1 of octet n encoding digit 2n-1 - bit 8 to 5 of octet n encoding digit 2n <p>-The PLMN identity consists of 3 digits from MCC followed by either</p> <ul style="list-style-type: none"> -a filler plus 2 digits from MNC (in case of 2 digit MNC) or -3 digits from MNC (in case of a 3 digit MNC).
>CN-ID	M		INTEGER (0..4095)	

9.3.3 PDU Definitions

```
-- *****
--
-- PDU definitions for RANAP.
--
-- *****

RANAP-PDU-Contents {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
umts-Access (20) modules (3) ranap (0) version1 (1) ranap-PDU-Contents (1) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- *****
--
-- IE parameter types from other modules.
--
-- *****

IMPORTS
    DataVolumeReference,
    AreaIdentity,
    CN-DomainIndicator,
    Cause,
    CriticalityDiagnostics,
    ChosenEncryptionAlgorithm,
    ChosenIntegrityProtectionAlgorithm,
    ClassmarkInformation2,
    ClassmarkInformation3,
    DL-GTP-PDU-SequenceNumber,
    DL-N-PDU-SequenceNumber,
    DataVolumeReportingIndication,
    DRX-CycleLengthCoefficient,
    EncryptionInformation,
    GlobalCN-ID,
    GlobalRNC-ID,
    IntegrityProtectionInformation,
    IuSignallingConnectionIdentifier,
    IuTransportAssociation,
    KeyStatus,
    L3-Information,
    LAI,
    NAS-PDU,
    NAS-SynchronisationIndicator,
    NonSearchingIndication,
    NumberOfSteps,
    OMC-ID,
```

```
OldBSS-ToNewBSS-Information,
PagingAreaID,
PagingCause,
PDP-TypeInformation,
PermanentNAS-UE-ID,
RAB-ID,
RAB-Parameters,
RAC,
RelocationType,
RequestType,
Requested-RAB-Parameter-Values,
SAI,
SAPI,
Service-Handover,
SourceID,
SourceRNC-ToTargetRNC-TransparentContainer,
TargetID,
TargetRNC-ToSourceRNC-TransparentContainer,
TemporaryUE-ID,
TraceReference,
TraceType,
UnsuccessfullyTransmittedDataVolume,
TransportLayerAddress,
TriggerID,
UE-ID,
UL-GTP-PDU-SequenceNumber,
UL-N-PDU-SequenceNumber,
UP-ModeVersions,
UserPlaneMode,
Alt-RAB-Parameters,
Ass-RAB-Parameters
FROM RANAP-IES
```

```
PrivateIE-Container{},
ProtocolExtensionContainer{},
ProtocolIE-ContainerList{},
ProtocolIE-ContainerPair{},
ProtocolIE-ContainerPairList{},
ProtocolIE-Container{},
RANAP-PRIVATE-IES,
RANAP-PROTOCOL-EXTENSION,
RANAP-PROTOCOL-IES,
RANAP-PROTOCOL-IES-PAIR
FROM RANAP-Containers
```

```
maxNrOfDTs,
maxNrOfErrors,
maxNrOfIuSigConIds,
maxNrOfRABs,
maxNrOfVol,
```


id-AreaIdentity,
id-Alt-RAB-Parameters,
id-Ass-RAB-Parameters,
id-CN-DomainIndicator,
id-Cause,
id-ChosenEncryptionAlgorithm,
id-ChosenIntegrityProtectionAlgorithm,
id-ClassmarkInformation2,
id-ClassmarkInformation3,
id-CriticalityDiagnostics,
id-DRX-CycleLengthCoefficient,
id-DirectTransferInformationItem-RANAP-RelocInf,
id-DirectTransferInformationList-RANAP-RelocInf,
id-DL-GTP-PDU-SequenceNumber,
id-EncryptionInformation,
id-GlobalCN-ID,
id-GlobalRNC-ID,
id-IntegrityProtectionInformation,
id-IuSigConId,
id-IuSigConIdItem,
id-IuSigConIdList,
id-IuTransportAssociation,
id-KeyStatus,
id-L3-Information,
id-LAI,
id-NAS-PDU,
id-NonSearchingIndication,
id-NumberOfSteps,
id-OMC-ID,
id-OldBSS-ToNewBSS-Information,
id-PagingAreaID,
id-PagingCause,
id-PermanentNAS-UE-ID,
id-RAB-ContextItem,
id-RAB-ContextList,
id-RAB-ContextFailedtoTransferItem,
id-RAB-ContextFailedtoTransferList,
id-RAB-ContextItem-RANAP-RelocInf,
id-RAB-ContextList-RANAP-RelocInf,
id-RAB-DataForwardingItem,
id-RAB-DataForwardingItem-SRNS-CtxReq,
id-RAB-DataForwardingList,
id-RAB-DataForwardingList-SRNS-CtxReq,
id-RAB-DataVolumeReportItem,
id-RAB-DataVolumeReportList,
id-RAB-DataVolumeReportRequestItem,
id-RAB-DataVolumeReportRequestList,
id-RAB-FailedItem,
id-RAB-FailedList,
id-RAB-FailedtoReportItem,

```

id-RAB-FailedtoReportList,
id-RAB-ID,
id-RAB-ModifyList,
id-RAB-ModifyItem,
id-RAB-QueuedItem,
id-RAB-QueuedList,
id-RAB-ReleaseFailedList,
id-RAB-ReleaseItem,
id-RAB-ReleasedItem-IuRelComp,
id-RAB-ReleaseList,
id-RAB-ReleasedItem,
id-RAB-ReleasedList,
id-RAB-ReleasedList-IuRelComp,
id-RAB-RelocationReleaseItem,
id-RAB-RelocationReleaseList,
id-RAB-SetupItem-RelocReq,
id-RAB-SetupItem-RelocReqAck,
id-RAB-SetupList-RelocReq,
id-RAB-SetupList-RelocReqAck,
id-RAB-SetupOrModifiedItem,
id-RAB-SetupOrModifiedList,
id-RAB-SetupOrModifyItem,
id-RAB-SetupOrModifyList,
id-RAC,
id-RelocationType,
id-RequestType,
id-SAI,
id-SAPI,
id-SourceID,
id-SourceRNC-ToTargetRNC-TransparentContainer,
id-TargetID,
id-TargetRNC-ToSourceRNC-TransparentContainer,
id-TemporaryUE-ID,
id-TraceReference,
id-TraceType,
id-TransportLayerAddress,
id-TriggerID,
id-UE-ID,
id-UL-GTP-PDU-SequenceNumber
FROM RANAP-Constants;

```

*** LOTS OF UNAFFECTED ASN.1 DESCRIPTION FROM SECTION 9.3.3 NOT SHOWN ***

```

-- *****
--
-- RELOCATION RESOURCE ALLOCATION ELEMENTARY PROCEDURE
--
-- *****

```

```

-- *****
--
-- Relocation Request
--
-- *****

RelocationRequest ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { {RelocationRequestIEs} },
    protocolExtensions   ProtocolExtensionContainer { {RelocationRequestExtensions} }          OPTIONAL,
    ...
}

RelocationRequestIEs RANAP-PROTOCOL-IES ::= {
    { ID id-PermanentNAS-UE-ID          CRITICALITY ignore TYPE PermanentNAS-UE-ID          PRESENCE conditional
    -- This IE is only present if available at the sending side --
    { ID id-Cause                        CRITICALITY ignore TYPE Cause                    PRESENCE mandatory } |
    { ID id-CN-DomainIndicator          CRITICALITY reject TYPE CN-DomainIndicator        PRESENCE mandatory } |
    { ID id-SourceRNC-ToTargetRNC-TransparentContainer
      CRITICALITY reject TYPE SourceRNC-ToTargetRNC-TransparentContainer PRESENCE mandatory } |
    { ID id-RAB-SetupList-RelocReq      CRITICALITY reject TYPE RAB-SetupList-RelocReq      PRESENCE optional } |
    { ID id-IntegrityProtectionInformation
      CRITICALITY ignore TYPE IntegrityProtectionInformation        PRESENCE conditional
    -- This IE is only present if available at the sending side --
    { ID id-EncryptionInformation      CRITICALITY ignore TYPE EncryptionInformation        PRESENCE optional } |
    { ID id-IuSigConId                  CRITICALITY ignore TYPE IuSignallingConnectionIdentifier    PRESENCE mandatory },
    ...
}

RAB-SetupList-RelocReq ::= RAB-IE-ContainerList { {RAB-SetupItem-RelocReq-IEs} }

RAB-SetupItem-RelocReq-IEs RANAP-PROTOCOL-IES ::= {
    { ID id-RAB-SetupItem-RelocReq      CRITICALITY reject TYPE RAB-SetupItem-RelocReq      PRESENCE mandatory },
    ...
}

RAB-SetupItem-RelocReq ::= SEQUENCE {
    rAB-ID                          RAB-ID,
    nAS-SynchronisationIndicator     NAS-SynchronisationIndicator          OPTIONAL
    -- This IE is present if the relevant NAS information is provided by the CN --,
    rAB-Parameters                   RAB-Parameters,
    dataVolumeReportingIndication     DataVolumeReportingIndication          OPTIONAL
    -- This IE, if applicable, is only present for RABs towards the PS domain --,
    pdp-TypeInformation               PDP-TypeInformation          OPTIONAL
    -- This IE is only present for RABs towards the PS domain --,
    userPlaneInformation              UserPlaneInformation,
    transportLayerAddress              TransportLayerAddress,
    iuTransportAssociation             IuTransportAssociation,
    service-Handover                  Service-Handover          OPTIONAL,
    iE-Extensions                     ProtocolExtensionContainer { {RAB-SetupItem-RelocReq-ExtIEs} }          OPTIONAL,
    ...
}

```

```

RAB-SetupItem-RelocReq-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
  { ID id-Alt-RAB-Parameters    CRITICALITY ignore    EXTENSION Alt-RAB-Parameters    PRESENCE optional},
  ...
}

UserPlaneInformation ::= SEQUENCE {
  userPlaneMode                UserPlaneMode,
  uP-ModeVersions              UP-ModeVersions,
  iE-Extensions                ProtocolExtensionContainer { {UserPlaneInformation-ExtIEs} }    OPTIONAL,
  ...
}

UserPlaneInformation-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
  ...
}

RelocationRequestExtensions RANAP-PROTOCOL-EXTENSION ::= {
  -- Extension for Release 4 --
  { ID id-GlobalCN-ID          CRITICALITY reject    EXTENSION GlobalCN-ID          PRESENCE optional},
  ...
}

```

***** LOTS OF UNAFFECTED ASN.1 DESCRIPTION FROM SECTION 9.3.3 NOT SHOWN *****

```

-- *****
--
-- RESET ELEMENTARY PROCEDURE
--
-- *****

-- *****
--
-- Reset
--
-- *****

Reset ::= SEQUENCE {
  protocolIEs          ProtocolIE-Container    { {ResetIEs} },
  protocolExtensions  ProtocolExtensionContainer { {ResetExtensions} }    OPTIONAL,
  ...
}

ResetIEs RANAP-PROTOCOL-IES ::= {
  { ID id-Cause                CRITICALITY ignore    TYPE Cause                PRESENCE mandatory } |
  { ID id-CN-DomainIndicator    CRITICALITY reject   TYPE CN-DomainIndicator    PRESENCE mandatory } |
  { ID id-GlobalRNC-ID          CRITICALITY ignore   TYPE GlobalRNC-ID          PRESENCE conditional
  -- This IE is always used in the uplink direction --
  },

```

```

}
...
}
ResetExtensions RANAP-PROTOCOL-EXTENSION ::= {
-- Extension for Release 4 --
{ ID id-GlobalCN-ID CRITICALITY ignore EXTENSION GlobalCN-ID PRESENCE optional},
...
}

-- *****
--
-- Reset Acknowledge
--
-- *****

ResetAcknowledge ::= SEQUENCE {
  protocolIEs ProtocolIE-Container { {ResetAcknowledgeIEs} },
  protocolExtensions ProtocolExtensionContainer { {ResetAcknowledgeExtensions} } OPTIONAL,
  ...
}

ResetAcknowledgeIEs RANAP-PROTOCOL-IES ::= {
  { ID id-CN-DomainIndicator CRITICALITY reject TYPE CN-DomainIndicator PRESENCE mandatory } |
  { ID id-CriticalityDiagnostics CRITICALITY ignore TYPE CriticalityDiagnostics PRESENCE optional } |
  { ID id-GlobalRNC-ID CRITICALITY ignore TYPE GlobalRNC-ID PRESENCE conditional
  -- This IE is always used in the uplink direction --
  },
  ...
}

ResetAcknowledgeExtensions RANAP-PROTOCOL-EXTENSION ::= {
-- Extension for Release 4 --
{ ID id-GlobalCN-ID CRITICALITY ignore EXTENSION GlobalCN-ID PRESENCE optional},
...
}

-- *****
--
-- RESET RESOURCE ELEMENTARY PROCEDURE
--
-- *****

-- *****
--
-- Reset Resource
--
-- *****

ResetResource ::= SEQUENCE {
  protocolIEs ProtocolIE-Container { {ResetResourceIEs} },
  protocolExtensions ProtocolExtensionContainer { {ResetResourceExtensions} } OPTIONAL,
  ...
}

```

```

}

ResetResourceIEs RANAP-PROTOCOL-IES ::= {
  { ID id-CN-DomainIndicator      CRITICALITY reject  TYPE CN-DomainIndicator      PRESENCE mandatory } |
  { ID id-Cause                   CRITICALITY ignore  TYPE Cause                          PRESENCE mandatory } |
  { ID id-IuSigConIdList          CRITICALITY ignore  TYPE ResetResourceList              PRESENCE mandatory } |
  { ID id-GlobalRNC-ID            CRITICALITY ignore  TYPE GlobalRNC-ID                   PRESENCE conditional
  -- This IE is always used in the uplink direction --
  },
  ...
}

ResetResourceList ::= IuSigConId-IE-ContainerList{ {ResetResourceItemIEs} }

ResetResourceItemIEs RANAP-PROTOCOL-IES ::= {
  { ID id-IuSigConIdItem          CRITICALITY reject  TYPE      ResetResourceItem          PRESENCE mandatory },
  ...
}

ResetResourceItem ::= SEQUENCE {
  iuSigConId      IuSignallingConnectionIdentifier,
  iE-Extensions   ProtocolExtensionContainer { { ResetResourceItem-ExtIEs} }      OPTIONAL,
  ...
}

ResetResourceItem-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
  ...
}

ResetResourceExtensions RANAP-PROTOCOL-EXTENSION ::= {
  -- Extension for Release 4 --
  { ID id-GlobalCN-ID            CRITICALITY ignore      EXTENSION GlobalCN-ID              PRESENCE optional},
  ...
}

-- *****
--
-- Reset Resource Acknowledge
--
-- *****

ResetResourceAcknowledge ::= SEQUENCE {
  protocolIEs      ProtocolIE-Container      { {ResetResourceAcknowledgeIEs} },
  protocolExtensions ProtocolExtensionContainer { {ResetResourceAcknowledgeExtensions} }      OPTIONAL,
  ...
}

ResetResourceAcknowledgeIEs RANAP-PROTOCOL-IES ::= {
  { ID id-CN-DomainIndicator      CRITICALITY reject  TYPE CN-DomainIndicator      PRESENCE mandatory } |
  { ID id-IuSigConIdList          CRITICALITY ignore  TYPE ResetResourceAckList     PRESENCE mandatory } |
  { ID id-GlobalRNC-ID            CRITICALITY ignore  TYPE GlobalRNC-ID             PRESENCE conditional
  -- This IE is always used in the uplink direction --
  } |

```

```

    { ID id-CriticalityDiagnostics          CRITICALITY ignore  TYPE CriticalityDiagnostics  PRESENCE optional },
    ...
}
ResetResourceAckList ::= IuSigConId-IE-ContainerList{ {ResetResourceAckItemIEs} }

ResetResourceAckItemIEs RANAP-PROTOCOL-IES ::= {
    { ID id-IuSigConIdItem                CRITICALITY reject  TYPE      ResetResourceAckItem          PRESENCE mandatory  },
    ...
}

ResetResourceAckItem ::= SEQUENCE {
    iuSigConId                IuSignallingConnectionIdentifier,
    IE-Extensions              ProtocolExtensionContainer { { ResetResourceAckItem-ExtIEs} }    OPTIONAL,
    ...
}

ResetResourceAckItem-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

ResetResourceAcknowledgeExtensions RANAP-PROTOCOL-EXTENSION ::= {
    -- Extension for Release 4 --
    { ID id-GlobalCN-ID                CRITICALITY ignore      EXTENSION GlobalCN-ID          PRESENCE optional},
    ...
}

```

***** LOTS OF UNAFFECTED ASN.1 DESCRIPTION FROM SECTION 9.3.3 NOT SHOWN *****

```

-- *****
--
-- ERROR INDICATION ELEMENTARY PROCEDURE
--
-- *****
--
-- *****
--
-- Error Indication
--
-- *****

ErrorIndication ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { {ErrorIndicationIEs} },
    protocolExtensions   ProtocolExtensionContainer { {ErrorIndicationExtensions} }    OPTIONAL,
    ...
}

ErrorIndicationIEs RANAP-PROTOCOL-IES ::= {
    { ID id-Cause                CRITICALITY ignore  TYPE Cause          PRESENCE conditional

```

```
-- At least either of Cause IE or Criticality IE shall be present --
{ ID id-CriticalityDiagnostics          CRITICALITY ignore TYPE CriticalityDiagnostics          PRESENCE conditional
-- At least either of Cause IE or Criticality IE shall be present --
{ ID id-CN-DomainIndicator             CRITICALITY ignore TYPE CN-DomainIndicator             PRESENCE conditional
-- This IE is always used when the message is sent connectionless --
{ ID id-GlobalRNC-ID                   CRITICALITY ignore TYPE GlobalRNC-ID                   PRESENCE conditional
-- This IE is always used in the uplink direction when message is sent connectionless --
...
}

ErrorIndicationExtensions RANAP-PROTOCOL-EXTENSION ::= {
-- Extension for Release 4 --
{ ID id-GlobalCN-ID                     CRITICALITY ignore     EXTENSION GlobalCN-ID                     PRESENCE optional},
...
}
```

*** LOTS OF UNAFFECTED ASN.1 DESCRIPTION FROM SECTION 9.3.3 NOT SHOWN ***

END

9.3.4 Information Element Definitions

```
-- *****
--
-- Information Element Definitions
--
-- *****

RANAP-IEs {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
umts-Access (20) modules (3) ranap (0) version1 (1) ranap-IEs (2) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN
```

****** LOTS OF UNAFFECTED ASN.1 DESCRIPTION FROM SECTION 9.3.4 NOT SHOWN ******

```
CN-DomainIndicator ::= ENUMERATED {
    cs-domain,
    ps-domain
}
```

```
CN-ID ::= INTEGER (0..4095)
```

```
-- D
```

```
DataVolumeReference ::= INTEGER (0..255)
```

****** LOTS OF UNAFFECTED ASN.1 DESCRIPTION FROM SECTION 9.3.4 NOT SHOWN ******

```
GA-Polygon-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}
```

```
GA-UncertaintyEllipse ::= SEQUENCE {
    uncertaintySemi-major    INTEGER (0..127),
    uncertaintySemi-minor    INTEGER (0..127),
    orientationOfMajorAxis    INTEGER (0..179),
    ...
}
```

```
GlobalCN-ID ::= SEQUENCE {
```

```
    PLMNidentity          PLMNidentity,  
    cN-ID                CN-ID  
}
```

```
GlobalRNC-ID ::= SEQUENCE {  
    PLMNidentity          PLMNidentity,  
    rNC-ID                RNC-ID  
}
```

***** LOTS OF UNAFFECTED ASN.1 DESCRIPTION FROM SECTION 9.3.4 NOT SHOWN *****

END

9.3.6 Constant Definitions

```
-- *****
--
-- Constant definitions
--
-- *****

RANAP-Constants {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
umts-Access (20) modules (3) ranap (0) version1 (1) ranap-Constants (4) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN
```

***** LOTS OF UNAFFECTED ASN.1 DESCRIPTION FROM SECTION 9.3.6 NOT SHOWN *****

```
-- *****
--
-- IEs
--
-- *****

id-AreaIdentity                INTEGER ::= 0
id-CN-DomainIndicator          INTEGER ::= 3
```

***** LOTS OF UNAFFECTED ASN.1 DESCRIPTION FROM SECTION 9.3.6 NOT SHOWN *****

```
id-RAB-ModifyList              INTEGER ::= 91
id-RAB-ModifyItem              INTEGER ::= 92
id-TypeOfError                 INTEGER ::= 93
id-GlobalCN-ID                INTEGER ::= 96
```

END

CHANGE REQUEST

⌘ **25.413 CR 297** ⌘ rev **2** ⌘ Current version: **4.1.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title:	⌘ Clarification on User Plane Version Indication (Rel 4)		
Source:	⌘ R-WG3		
Work item code:	⌘ TrFO	Date:	⌘ 2001-08-22
Category:	⌘ F	Release:	⌘ Rel-4
<p>Use <u>one</u> of the following categories:</p> <p>F (essential correction) A (corresponds to a correction in an earlier release) B (Addition of feature), C (Functional modification of feature) D (Editorial modification)</p> <p>Detailed explanations of the above categories can be found in 3GPP TR 21.900.</p>		<p>Use <u>one</u> of the following releases:</p> <p>2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)</p>	

Reason for change:	⌘ The CN shall, as a consequence of the OoB negotiation, request the appropriate user plane version(s) instead of (all) the user plane mode versions supported by the CN to ensure that the proper user plane version supporting TrFO will be initialised.
	The CN shall therefore require the user plane version(s) that support TrFO and not all supported by the CN.
	This CR is in line with approved CRs to 23.153 (CR024r1, N4-010683) and 29.232 (CR007r1, N4-010691), where the issue raised above was corrected.
Summary of change:	⌘ The CN shall, as a consequence of the OoB negotiation, request the appropriate user plane version(s) instead of (all) the user plane mode versions supported by the CN to ensure that the proper user plane version supporting TrFO will be initialised.
Consequences if not approved:	⌘ The RNC might initialise a user plane version that do not support features negotiated OoB.

Clauses affected:	⌘ 8.2.2, 8.7.2, 9.2.1.19		
Other specs affected:	<input checked="" type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications	⌘	25.410 CR021 Rel-4, 25.415 CR062 Rel-4
Other comments:	⌘		

How to create CRs using this form:

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- 1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under <ftp://www.3gpp.org/specs/> For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.
- 3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

8.2.2 Successful Operation

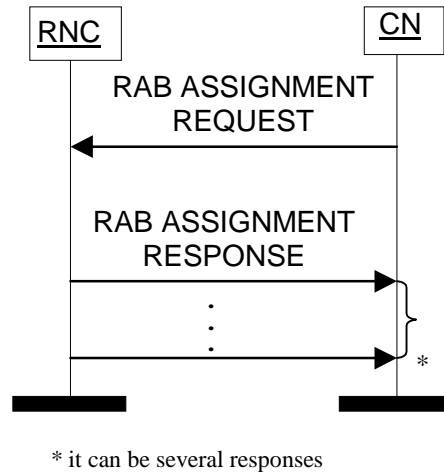


Figure 1: RAB Assignment procedure. Successful operation.

The CN shall initiate the procedure by sending a RAB ASSIGNMENT REQUEST message. When sending the RAB ASSIGNMENT REQUEST message, the CN shall start the $T_{RABAssgt}$ timer.

The CN may request UTRAN to:

- establish,
- modify,
- release

one or several RABs with one RAB ASSIGNMENT REQUEST message.

The message shall contain the information required by the UTRAN to build the new RAB configuration, such as:

- list of RABs to establish or modify with their bearer characteristics;
- list of RABs to release.

For each RAB requested to establish, the message shall contain:

- RAB ID.
- RAB parameters (including e.g. Allocation/Retention Priority).
- User Plane Mode Information (i.e. required User Plane Mode and required UP Mode Versions).
- Transport Layer Address.
- Iu Transport Association.
- PDP Type Information (only for PS)
- Data Volume Reporting Indication (only for PS).
- DL GTP-PDU sequence number (only when GTP-PDU sequence number is available in cases of handover from GPRS to UMTS or when establishing a RAB for an existing PDP context).
- UL GTP-PDU sequence number (only when GTP-PDU sequence number is available in cases of handover from GPRS to UMTS or when establishing a RAB for an existing PDP context).
- DL N-PDU sequence number (only when N-PDU sequence number is available in case of handover from GPRS to UMTS).

- UL N-PDU sequence number (only when N-PDU sequence number is available in case of handover from GPRS to UMTS).

For each RAB requested to modify, the message may contain:

- RAB ID (mandatory).
- NAS Synchronisation Indicator.
- RAB parameters.
- Transport Layer Address.
- Iu Transport Association.

For each RAB request to release, the message shall contain:

- RAB ID.
- Cause.

Upon reception of the RAB ASSIGNMENT REQUEST message UTRAN shall execute the requested RAB configuration. The CN may indicate that RAB QoS negotiation is allowed for certain RAB parameters and in some cases also which alternative values to be used in the negotiation.

The RAB ID shall identify uniquely the RAB for the specific CN domain for the particular UE, which makes the RAB ID unique over the Iu connection on which the RAB ASSIGNMENT REQUEST message is received. When a RAB ID already in use over that particular Iu instance is used, the procedure is considered as modification of that RAB.

The RNC shall pass the contents of *RAB ID* IE to the radio interface protocol for each RAB requested to establish or modify.

The RNC shall establish or modify the resources according to the values of the *Allocation/Retention Priority* IE (priority level, pre-emption indicators, queuing) and the resource situation as follows:

- The RNC shall consider the priority level of the requested RAB, when deciding on the resource allocation.
- If the requested RAB is allowed for queuing and the resource situation so requires, RNC may place the RAB in the establishment queue.
- The priority levels and the pre-emption indicators may (singularly or in combination) be used to determine whether the RAB assignment has to be performed unconditionally and immediately. If the requested RAB is marked as "may trigger pre-emption" and the resource situation so requires, RNC may trigger the pre-emption procedure which may then cause the forced release of a lower priority RAB which is marked as "pre-emptable". Whilst the process and the extent of the pre-emption procedure is operator dependent, the pre-emption indicators, if given in the RAB ASSIGNMENT REQUEST message, shall be treated as follows:
 1. The values of the last received *Pre-emption Vulnerability* IE and *Priority Level* IE shall prevail.
 2. If the *Pre-emption Capability* IE is set to "may trigger pre-emption", then this allocation request may trigger the pre-emption procedure.
 3. If the *Pre-emption Capability* IE is set to "shall not trigger pre-emption", then this allocation request shall not trigger the pre-emption procedure.
 4. If the *Pre-emption Vulnerability* IE is set to "pre-emptable", then this connection shall be included in the pre-emption process.
 5. If the *Pre-emption Vulnerability* IE is set to "not pre-emptable", then this connection shall not be included in the pre-emption process.
 6. If the *Priority Level* IE is set to "no priority used" the given values for the *Pre-emption Capability* IE and *Pre-emption Vulnerability* IE shall not be considered. Instead the values "shall not trigger pre-emption" and "not pre-emptable" shall prevail.

- If the *Allocation/Retention Priority* IE is not given in the RAB ASSIGNMENT REQUEST message, the allocation request shall not trigger the pre-emption process and the connection may be pre-empted and considered to have the value "lowest" as priority level. Moreover, queuing shall not be allowed.
- The UTRAN pre-emption process shall keep the following rules:
 1. UTRAN shall only pre-empt RABs with lower priority, in ascending order of priority.
 2. The pre-emption may be done for RABs belonging to the same UE or to other UEs.

If the *NAS Synchronisation Indicator* IE is contained in the RAB ASSIGNMENT REQUEST message, the RNC shall pass it to the radio interface protocol for the transfer to the UE.

If the RAB ASSIGNMENT REQUEST message includes the *PDP Type Information* IE, the UTRAN may use this to configure any compression algorithms.

If the *Service Handover* IE is included, this tells if the RAB

- should be handed over to GSM, i.e. from NAS point of view, the RAB should be handed over to GSM as soon as possible although the final decision whether to perform a handover to GSM is still made in UTRAN.
- should not be handed over to GSM, i.e. from NAS point of view, the RAB should remain in UMTS as long as possible although the final decision whether to perform a handover to GSM is still made in UTRAN.
- shall not be handed over to GSM, i.e. the RAB shall never be handed over to GSM. This means that UTRAN shall not initiate handover to GSM for the UE unless the RABs with this indication have first been released with the normal release procedures.

The value of the *Service Handover* IE is valid throughout the lifetime of the RAB or until changed by a RAB modification.

The *Service Handover* IE shall only influence decisions made regarding UTRAN initiated handovers.

If the *Service Handover* IE is not included, the decision whether to perform a handover to GSM is only an internal UTRAN matter.

UTRAN shall report to CN, in the first RAB ASSIGNMENT RESPONSE message, the result for all the requested RABs, such as:

- List of RABs successfully established or modified.
- List of RABs released.
- List of RABs queued.
- List of RABs failed to establish or modify.
- List of RABs failed to release.

If any alternative RAB parameter values have been used when establishing or modifying a RAB, these RAB parameter values shall be included in the RAB ASSIGNMENT RESPONSE message.

UTRAN shall report the outcome of a specific RAB to establish or modify only after the transport network control plane signalling, which is needed for RAB establishment or modification, has been executed. At a RAB establishment, the transport network control plane signalling shall use the *Transport Layer Address* IE and *Iu Transport Association* IE. At a RAB modification, it is up to the RNC to decide if any transport network control plane signalling shall be performed or if the already existing transport bearer shall be used. If the RNC decides to establish a new transport bearer, the transport network control plane signalling shall use the possibly included *Transport Layer Address* IE and *Iu Transport Association* IE. Then the switch over to this new transport bearer shall be done immediately after transport bearer establishment and initialisation of the user plane mode. If the RNC decides to modify the already existing transport bearer, the transport network control plane signalling shall not use the possibly included *Transport Layer Address* IE and *Iu Transport Association* IE. That is, re-binding with *Iu Transport Association* IE shall not be done.

Before reporting the successful outcome of a specific RAB to establish or modify, the RNC shall have executed the initialisation of the user plane mode as requested by the CN in the *User Plane Mode* IE. If the RNC is requested to execute the user plane initialisation for the *User Plane Mode* "support mode for predefined SDU sizes", it shall initialise

all RAB subflow combinations on Iu as indicated in the *RAB parameters* IE. If not all of the indicated RAB subflow combinations can be initialised the RAB Assignment fails with the cause value "RNC unable to establish all RFCs". The user plane initialisation is described in ref.[6].

In case of establishment of a RAB for the PS domain, the CN must be prepared to receive user data before the RAB ASSIGNMENT RESPONSE message has been received.

If none of the RABs have been queued, the CN shall stop timer $T_{RABAssgt}$. And the RAB Assignment procedure terminates. In that case, the procedure shall also be terminated in UTRAN.

When the request to establish or modify one or several RABs is put in the queue, UTRAN shall start the timer $T_{QUEUING}$. This timer specifies the maximum time for queuing of the request of establishment or modification. The same timer $T_{QUEUING}$ is supervising all RABs being queued.

For each RAB that is queued the following outcomes shall be possible:

- successfully established or modified;
- failed to establish or modify;
- failed due to expiry of the timer $T_{QUEUING}$.

For the queued RABs, indicated in the first RAB ASSIGNMENT RESPONSE message, UTRAN shall report the outcome of the queuing for every RAB individually or for several RABs in subsequent RAB ASSIGNMENT RESPONSE message(s). This is left to implementation. UTRAN shall stop $T_{QUEUING}$ when all RABs have been either successfully established or modified or failed to establish or modify. The RAB Assignment procedure is then terminated both in CN and UTRAN when all RABs have been responded to.

When CN receives the response that one or several RABs are queued, CN shall expect UTRAN to provide the outcome of the queuing function for each RAB before expiry of the $T_{RABAssgt}$ timer. In case the timer $T_{RABAssgt}$ expires, the CN shall consider the RAB Assignment procedure terminated and the RABs not reported shall be considered as failed.

In the case the timer $T_{QUEUING}$ expires, the RAB Assignment procedure terminates in UTRAN for all queued RABs, and UTRAN shall respond for all of them in one RAB ASSIGNMENT RESPONSE message. The RAB Assignment procedure shall also be terminated in CN.

In case a request to modify or release a RAB contains the RAB ID of a RAB being queued, the RAB shall be taken out of the queue and treated according to the second request. The first request shall be responded to as a RAB failed to setup or modify with the cause value "Request superseded".

When UTRAN reports unsuccessful establishment/modification of a RAB, the cause value should be precise enough to enable the core network to know the reason for unsuccessful establishment/modification. Typical cause values are: "Requested Traffic Class not Available", "Invalid RAB Parameters Value", "Requested Maximum Bit Rate not Available", "Requested Maximum Bit Rate for DL not Available", "Requested Maximum Bit Rate for UL not Available", "Requested Guaranteed Bit Rate not Available", "Requested Guaranteed Bit Rate for DL not Available", "Requested Guaranteed Bit Rate for UL not Available", "Requested Transfer Delay not Achievable", "Invalid RAB Parameters Combination", "Condition Violation for SDU Parameters", "Condition Violation for Traffic Handling Priority", "Condition Violation for Guaranteed Bit Rate", "User Plane Versions not Supported", "Iu UP Failure", "Iu Transport Connection Failed to Establish".

If the RAB ID of a RAB requested to be released is unknown in the RNC, this shall be reported as a RAB failed to release with the cause value "Invalid RAB ID".

The RNC may indicate an impending directed retry attempt to GSM by sending RAB ASSIGNMENT RESPONSE message with a RAB ID included in the list of RABs failed to setup and a cause value of "Directed Retry".

The RNC shall be prepared to receive a RAB ASSIGNMENT REQUEST message containing a *RABs To Be Released* IE at any time and shall always reply to it. If there is an ongoing RAB Assignment procedure for a RAB indicated within the *RABs To Be Released* IE, the RNC shall discard the preceding RAB Assignment procedure for that specific RAB, release any related resources and report the released RAB within the RAB ASSIGNMENT RESPONSE message.

After sending RAB ASSIGNMENT RESPONSE message containing RAB ID within the *RABs Released* IE, the RNC shall be prepared to receive new establishment request of a RAB identified by the same RAB ID

8.7.2 Successful Operation

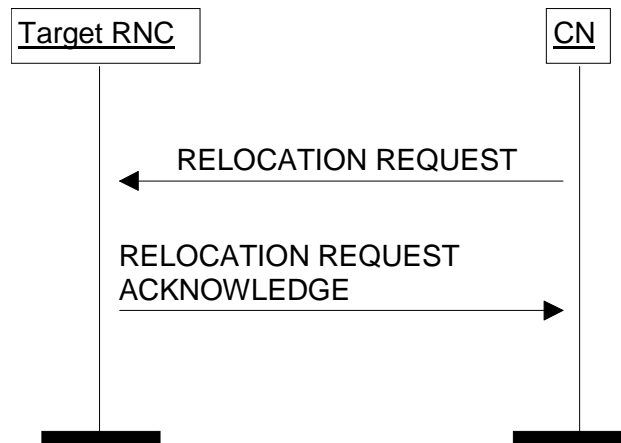


Figure 2: Relocation Resource Allocation procedure. Successful operation.

The CN shall initiate the procedure by generating RELOCATION REQUEST message. In a UTRAN to UTRAN relocation, this message shall contain the information (if any) required by the UTRAN to build the same RAB configuration as existing for the UE before the relocation. The CN may indicate that RAB QoS negotiation is allowed for certain RAB parameters and in some cases also which alternative values to be used in the negotiation.

The CN shall transmit the RELOCATION REQUEST message to target RNC and the CN shall start the timer $T_{\text{RELOCalloc}}$.

Upon reception of the RELOCATION REQUEST message, the target RNC shall initiate allocation of requested resources. The following information elements received in RELOCATION REQUEST message require the same special actions in the RNC as specified for the same IEs in the RAB Assignment procedure:

- RAB-ID
- User plane mode (i.e. required User Plane Mode and required User Plane Versions)
- Priority level, queuing and pre-emption indication
- Service Handover

If the RELOCATION REQUEST message includes the *PDP Type Information IE*, the UTRAN may use this to configure any compression algorithms.

The *Cause IE* shall contain the same value as the one received in the related RELOCATION REQUIRED message.

The *Iu Signalling Connection Identifier IE* contains an Iu signalling connection identifier which is allocated by the CN, and which the RNC is required to store and remember for the duration of the Iu connection.

Following additional actions shall be executed in the target RNC during Relocation Resource Allocation procedure:

If the relocation type is "UE involved in relocation of SRNS":

- The target RNC may accept a requested RAB only if the RAB can be supported by the target RNC.
- Other RABs shall be rejected by the target RNC in the RELOCATION REQUEST ACKNOWLEDGE message with an appropriate value for *Cause IE*, e.g. "Unable to Establish During Relocation".
- The target RNC shall include information adapted to the resulting RAB configuration in the target to source RNC transparent container to be included in the RELOCATION REQUEST ACKNOWLEDGE message sent to the CN. If the target RNC supports triggering of the Relocation Detect procedure via the Iur interface, the RNC shall assign a d-RNTI for the context of the relocation and include it in the container. If two CNs are involved in the relocation of SRNS, the target RNC may, however, decide to send the container to only one CN.
- If any alternative RAB parameter values have been used when allocating the resources, these RAB parameter values shall be included in the RELOCATION REQUEST ACKNOWLEDGE message.

If the relocation type IE is "UE not involved in relocation of SRNS":

- The target RNC may accept a RAB only if the radio bearer(s) for the RAB either exist(s) already, and can be used for the RAB by the target RNC, or does not exist before the relocation but can be established in order to support the RAB in the target RNC.
- If existing radio bearers are not related to any RAB that is accepted by target RNC, the radio bearers shall be ignored during the relocation of SRNS and the radio bearers shall be released by radio interface protocols after completion of relocation of SRNS.
- If any alternative RAB parameter values have been used when allocating the resources, these RAB parameter values shall be included in the RELOCATION REQUEST ACKNOWLEDGE message. It should be noted that the usage of alternative RAB parameter values is not applicable to the UTRAN initiated relocation of type "UE not involved in relocation of SRNS".

After all necessary resources for accepted RABs including the initialised Iu user plane, are successfully allocated, the target RNC shall send RELOCATION REQUEST ACKNOWLEDGE message to the CN. The resources associated with the RABs indicated as failed to set up shall not be released in the CN until the relocation is completed. This is in order to make a return to the old configuration possible in case of a failed or cancelled relocation.

The RELOCATION REQUEST ACKNOWLEDGE message received by the CN may optionally contain a transparent container, which shall be transferred by CN to the source RNC or the external relocation source while completing the Relocation Preparation procedure.

If one or more of the RABs that the target RNC has decided to support can not be supported by the CN, then these failed RABs shall not be released towards the target RNC until the relocation is completed.

If the *NAS Synchronisation Indicator* IE is contained in the RELOCATION REQUEST message, the target RNC shall pass it to the source RNC within the *RRC Container* IE contained in the *Target RNC to Source RNC Transparent Container* IE.

Transmission and reception of RELOCATION REQUEST ACKNOWLEDGE message terminates the procedure in the UTRAN and the CN respectively.

Before reporting the successful outcome of the Relocation Resource allocation procedure, the RNC shall have executed the initialisation of the user plane mode as requested by the CN in the *User Plane Mode* IE. If the RNC is requested to execute the user plane initialisation for the *User Plane Mode* "support mode for predefined SDU sizes", it shall initialise all RAB subflow combinations on Iu as indicated in the *RAB parameters* IE. If not all of the indicated RAB subflow combinations can be initialised the RAB Assignment fails with the cause value "RNC unable to establish all RFCs". The user plane initialisation is described in ref.[6].

9.2.1.19 UP Mode Versions

UP mode versions IE is an information element that is sent by CN to RNC. It is a bit string that indicates the versions for the selected Iu UP mode that are required and supported by the CN. The Iu User plane mode versions are defined in [6].

IE/Group Name	Presence	Range	IE type and reference	Semantics description
UP Mode Versions	M		BIT STRING (16)	Indicates the versions of the selected UP mode that are <u>required and supported</u> by the CN Bit 0 set to '1' equals version 1 Bit 1 set to '1' equals version 2 , ...

CHANGE REQUEST

⌘ **25.413 CR 302** ⌘ rev **7** ⌘ Current version: **4.1.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title:	⌘ Release 4 additions in Iu to support new positioning methods		
Source:	⌘ R-WG3		
Work item code:	⌘ TEI	Date:	⌘ 29 August, 2001
Category:	⌘ F	Release:	⌘ REL-4
<p>Use <u>one</u> of the following categories:</p> <p>F (essential correction) A (corresponds to a correction in an earlier release) B (Addition of feature), C (Functional modification of feature) D (Editorial modification)</p> <p>Detailed explanations of the above categories can be found in 3GPP TR 21.900.</p>		<p>Use <u>one</u> of the following releases:</p> <p>2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)</p>	

Reason for change:	<p>⌘ Some of the new positioning methods that will be supported in Release 4 UTRAN require that the CN is able to request the UTRAN to send assistance data related to the positioning method either to the CN or to the UE. Also since the positioning methods are enhancing, the CN should have the possibility to request the location with more precise quality of service requirements.</p> <p>The release 4 stage 2 document for UE Positioning in UTRAN (25.305) refers to the stage 2 document "Functional stage 2 description of LCS" (23.271) for the messages and operations over Iu. 23.271 describes 3 different functions over the Iu interface.</p> <ol style="list-style-type: none"> 1. A request for the current position of a UE. 2. A request asking UTRAN to send dedicated assistance data to the UE. 3. A request for deciphering keys to enable the UE to decode broadcasted assistance data. The keys should be returned to the CN, which forwards them to the UE. <p>RANAP currently supports case 1 above, but in order to support cases 2 and 3 the RANAP requests from the CN needs to be extended. The following additional IEs needs to be added to the request messages:</p> <ul style="list-style-type: none"> • Requested QoS needs to include also a possibility to ask for vertical accuracy, response time and priority. • Positioning method, i.e. GPS or OTDOA (for case 2 and 3) • Requested assistance data (for case 3) <p>The response message also needs to carry some additional information:</p> <ul style="list-style-type: none"> • Deciphering keys (for case 3) • For case 2, the response message needs to indicate positive acknowledgement.
Summary of change:	<p>⌘ Add the missing IEs, Vertical accuracy, Response time and Priority to the Location Reporting Control. A new elementary procedure "Location Related Data" is added to perform the required two services:</p>

		- the CN requests the RNC to deliver Assistance Data to UE. - the CN requests the Deciphering Keys from the RNC
Consequences if not approved:	⌘	The new positioning methods added in Release 4 UTRAN will not be fully supported. Mobile Originated positioning as described in 23.271 will not be supported. Backwards compatibility analysis: The ASN1 changes are made in a backwards compatible way.
Clauses affected:	⌘	2, 7, 8.1, 8.19.2, 8.x, 9.1.x1 – x3, 9.2.1.1, 9.2.1.4, 9.2.1.16, 9.2.3.x1 – x3, 9.3.2, 9.3.3, 9.3.4 and 9.3.6
Other specs affected:	⌘	<input type="checkbox"/> Other core specifications ⌘ <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications
Other comments:	⌘	

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- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under <ftp://www.3gpp.org/specs/> For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.
- 3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply".
- For a non-specific reference, the latest version applies".

- [1] 3GPP TR 23.930: "3rd Generation Partnership Project (3GPP) Technical Specification Group Services and System Aspects; Iu Principles".
- [2] 3GPP TS 25.410: "3rd Generation Partnership Project (3GPP) Technical Specification Group Radio Access Network; UTRAN Iu Interface: General Aspects and Principles".
- [3] 3GPP TS 25.401: "3rd Generation Partnership Project (3GPP) Technical Specification Group Radio Access Network; UTRAN Overall Description".
- [4] 3GPP TR 25.931: "3rd Generation Partnership Project (3GPP) Technical Specification Group Radio Access Network; UTRAN Functions, Examples on Signalling Procedures".
- [5] 3GPP TS 25.412: "3rd Generation Partnership Project (3GPP) Technical Specification Group Radio Access Network; UTRAN Iu Interface Signalling Transport".
- [6] 3GPP TS 25.415: "3rd Generation Partnership Project (3GPP) Technical Specification Group Radio Access Network; UTRAN Iu Interface User Plane Protocols".
- [7] 3GPP TS 23.107: "3rd Generation Partnership Project (3GPP) Technical Specification Group Services and System Aspects; QoS Concept and Architecture".
- [8] 3GPP TS 24.008: "3rd Generation Partnership Project (3GPP); Mobile radio interface layer 3 specification, Core Network Protocols – Stage 3".
- [9] 3GPP TS 25.414: "3rd Generation Partnership Project (3GPP) Technical Specification Group Radio Access Network; Iu Interface Data Transport and Transport Signalling".
- [10] 3GPP TS 25.331: "3rd Generation Partnership Project (3GPP) Technical Specification Group Radio Access Network; RRC Protocol Specification".
- [11] 3GPP TS 08.08: "Mobile services Switching Centre – Base Station System (MSC – BSS) interface".
- [12] 3GPP TS 12.08: "Subscriber and equipment trace".
- [13] X.691 (12/97): "Information Technology - ASN.1 encoding rules - Specification of Packed Encoding Rules (PER)".
- [14] X.680, (12/97): "Information Technology - Abstract Syntax Notation One (ASN.1):Specification of basic notation".
- [15] X.681 (12/97): "Information Technology - Abstract Syntax Notation One (ASN.1): Information object specification".
- [16] 3GPP TS 23.110: "3rd Generation Partnership Project (3GPP) Technical Specification Group Services and System Aspects, UMTS Access Stratum, Services and Functions".
- [17] 3GPP TS 25.323: "3rd Generation Partnership Project (3GPP) Technical Specification Group Radio Access Network; Packet Data Convergence Protocol (PDCP) Specification".
- [18] 3GPP TS 25.921: "3rd Generation Partnership Project (3GPP) Technical Specification Group Radio Access Network; Guidelines and principles for protocol description and error handling".

- [19] 3GPP TS 23.003: "3rd Generation Partnership Project (3GPP) Technical Specification Group Core Network; Numbering, addressing and identification".
- [20] 3GPP TS 23.032: "3rd Generation Partnership Project (3GPP) Technical Specification Group Core Network; Universal Geographical Area Description (GAD)".
- [21] 3GPP TS 23.060: "3rd Generation Partnership Project (3GPP) Technical Specification Group Services and System Aspect; General Packet Radio Service (GPRS); Service description; Stage 2".
- [22] 3GPP TS 24.080: "3rd Generation Partnership Project (3GPP) Technical Specification Group Core Network; Mobile radio interface layer 3 supplementary services specification; Formats and coding".

7 Functions of RANAP

RANAP protocol has the following functions:

- Relocating serving RNC. This function enables to change the serving RNC functionality as well as the related Iu resources (RAB(s) and Signalling connection) from one RNC to another.
- Overall RAB management. This function is responsible for setting up, modifying and releasing RABs.
- Queuing the setup of RAB. The purpose of this function is to allow placing some requested RABs into a queue, and indicate the peer entity about the queuing.
- Requesting RAB release. While the overall RAB management is a function of the CN, the RNC has the capability to request the release of RAB.
- Release of all Iu connection resources. This function is used to explicitly release all resources related to one Iu connection.
- Requesting the release of all Iu connection resources. While the Iu release is managed from the CN, the RNC has the capability to request the release of all Iu connection resources from the corresponding Iu connection.
- SRNS context forwarding function. This function is responsible for transferring SRNS context from the RNC to the CN for intersystem forward handover in case of packet forwarding.
- Controlling overload in the Iu interface. This function allows adjusting the load in the Iu interface.
- Resetting the Iu. This function is used for resetting an Iu interface.
- Sending the UE Common ID (permanent NAS UE identity) to the RNC. This function makes the RNC aware of the UE's Common ID.
- Paging the user. This function provides the CN for capability to page the UE.
- Controlling the tracing of the UE activity. This function allows setting the trace mode for a given UE. This function also allows the deactivation of a previously established trace.
- Transport of NAS information between UE and CN (ref. [8]). This function has two sub-classes:
 1. Transport of the initial NAS signalling message from the UE to CN. This function transfers transparently the NAS information. As a consequence also the Iu signalling connection is set up.
 2. Transport of NAS signalling messages between UE and CN, This function transfers transparently the NAS signalling messages on the existing Iu signalling connection. It also includes a specific service to handle signalling messages differently.
- Controlling the security mode in the UTRAN. This function is used to send the security keys (ciphering and integrity protection) to the UTRAN, and setting the operation mode for security functions.
- Controlling location reporting. This function allows the CN to operate the mode in which the UTRAN reports the location of the UE.
- Location reporting. This function is used for transferring the actual location information from RNC to the CN.
- Data volume reporting function. This function is responsible for reporting unsuccessfully transmitted DL data volume over UTRAN for specific RABs.
- Reporting general error situations. This function allows reporting of general error situations, for which function specific error messages have not been defined.
- Location related data. This function allows the CN to either retrieve from the RNC deciphering keys (to be forwarded to the UE) for the broadcasted assistance data, or request the RNC to deliver dedicated assistance data to the UE.

These functions are implemented by one or several RANAP elementary procedures described in the following clause.

8.1 Elementary Procedures

In the following tables, all EPs are divided into Class 1, Class 2 and Class 3 EPs (see subclause 3.1 for explanation of the different classes):

Table 1: Class 1

Elementary Procedure	Initiating Message	Successful Outcome	Unsuccessful Outcome
		Response message	Response message
Iu Release	IU RELEASE COMMAND	IU RELEASE COMPLETE	
Relocation Preparation	RELOCATION REQUIRED	RELOCATION COMMAND	RELOCATION PREPARATION FAILURE
Relocation Resource Allocation	RELOCATION REQUEST	RELOCATION REQUEST ACKNOWLEDGE	RELOCATION FAILURE
Relocation Cancel	RELOCATION CANCEL	RELOCATION CANCEL ACKNOWLEDGE	
SRNS Context Transfer	SRNS CONTEXT REQUEST	SRNS CONTEXT RESPONSE	
Security Mode Control	SECURITY MODE COMMAND	SECURITY MODE COMPLETE	SECURITY MODE REJECT
Data Volume Report	DATA VOLUME REPORT REQUEST	DATA VOLUME REPORT	
Reset	RESET	RESET ACKNOWLEDGE	
Reset Resource	RESET RESOURCE	RESET RESOURCE ACKNOWLEDGE	
<u>Location related Data</u>	<u>LOCATION RELATED DATA REQUEST</u>	<u>LOCATION RELATED DATA RESPONSE</u>	<u>LOCATION RELATED DATA FAILURE</u>

Table 2: Class 2

Elementary Procedure	Message
RAB Modification Request	RAB MODIFY REQUEST
RAB Release Request	RAB RELEASE REQUEST
Iu Release Request	IU RELEASE REQUEST
Relocation Detect	RELOCATION DETECT
Relocation Complete	RELOCATION COMPLETE
SRNS Data Forwarding Initiation	SRNS DATA FORWARD COMMAND
SRNS Context Forwarding from Source RNC to CN	FORWARD SRNS CONTEXT
SRNS Context Forwarding to Target RNC from CN	FORWARD SRNS CONTEXT
Paging	PAGING
Common ID	COMMON ID
CN Invoke Trace	CN INVOKE TRACE
CN Deactivate Trace	CN DEACTIVATE TRACE
Location Reporting Control	LOCATION REPORTING CONTROL
Location Report	LOCATION REPORT
Initial UE Message	INITIAL UE MESSAGE
Direct Transfer	DIRECT TRANSFER
Overload Control	OVERLOAD
Error Indication	ERROR INDICATION

Table 3: Class 3

Elementary Procedure	Initiating Message	Response Message
RAB Assignment	RAB ASSIGNMENT REQUEST	RAB ASSIGNMENT RESPONSE x N (N>=1)

The following applies concerning interference between Elementary Procedures:

- The Reset procedure takes precedence over all other EPs.
- The Reset Resource procedure takes precedence over all other EPs except the Reset procedure.
- The Iu Release procedure takes precedence over all other EPs except the Reset procedure and the Reset Resource procedure.

8.19 Location Reporting Control

8.19.1 General

The purpose of the Location Reporting Control procedure is to allow the CN to request information on the location of a given UE. The procedure uses connection oriented signalling.

8.19.2 Successful Operation



Figure 1: Location Reporting Control procedure. Successful operation.

The CN shall initiate the procedure by generating a LOCATION REPORTING CONTROL message.

The *Request Type* IE shall indicate to the serving RNC whether:

- to report directly;
- to report upon change of Service area, or
- to stop reporting at change of Service Area.

If reporting upon change of Service Area is requested, the Serving RNC shall report whenever the UE moves between Service Areas. For this procedure, only Service Areas that are defined for the PS and CS domains shall be considered.

The *Request Type* IE shall also indicate what type of location information the serving RNC shall report. The location information is either of the following types:

- Service Area Identifier, or
- Geographical coordinates, with or without requested accuracy, response time, priority and the client type.

A request for a direct report can be done in parallel with having an active request to report upon change of Service Area for the same UE. The request to report upon change of Service Area shall not be affected by this.

Interaction with Relocation:

The order to perform location reporting at change of Service Area is lost in UTRAN at successful Relocation of SRNS. If the location reporting at change of Service Area shall continue also after the relocation has been performed, the Location Reporting Control procedure shall thus be re-initiated from the CN towards the future SRNC after the Relocation Resource Allocation procedure has been executed successfully.

8.19.3 Abnormal Conditions

Not applicable.

8.30 RAB Modification Request

8.30.1 General

The purpose of the RAB Modification procedure is to allow RNC to initiate renegotiation of RABs for a given UE after RAB establishment. The procedure uses connection oriented signalling.

8.30.2 Successful Operation

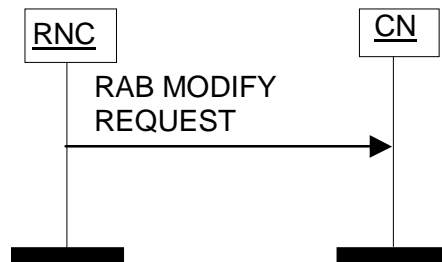


Figure 2: RAB Modification procedure.

The RNC shall initiate the procedure by generating a RAB MODIFY REQUEST message towards the CN. Under the *RABs To Be Modified* IE of the RAB MODIFY REQUEST message, the *RAB ID* IE shall identify the RABs for which modifications are requested, and the corresponding *Requested RAB Parameter Values* IE shall list those RAB parameters the RNC would like modified and the associated new RAB parameter values it is requesting. For any given RAB, RNC shall be able to propose modifications to any negotiable RAB parameters.

Upon reception of the RAB MODIFY REQUEST message, it is up to the CN to decide how to react to the request.

8.30.3 Abnormal Conditions

Not applicable.

8.x Location Related Data

8.x.1 General

The purpose of the Location Related Data procedure is to provide the means to handle additional Location related requests over the Iu interface: it allows the CN to either retrieve from the RNC deciphering keys (to be forwarded to the UE) for the broadcasted assistance data, or request the RNC to deliver dedicated assistance data to the UE.

8.x.2 Successful Operation

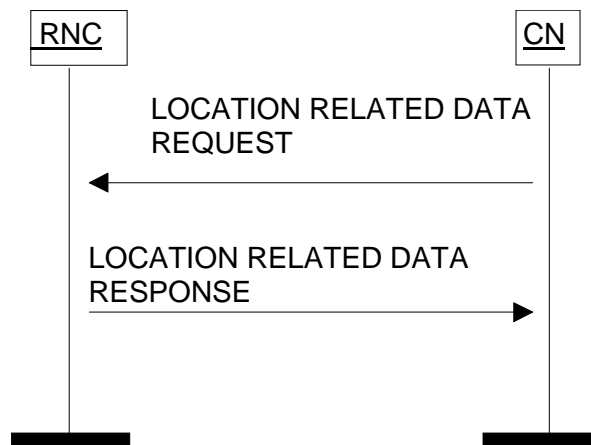


Figure X: Location Related Data procedure. Successful operation.

The CN initiates the procedure by generating an **LOCATION RELATED DATA REQUEST** message to the RNC.

Upon the reception of the **LOCATION RELATED DATA REQUEST** message, the RNC shall initiate requested function as indicated in the *Location Related Data Request Type IE*.

The *Location Related Data Request Type IE* shall indicate to the RNC whether:

- to start **dedicated** assistance data delivery to the UE, or
- to send deciphering keys for **broadcast** assistance data to the CN.

If the **LOCATION RELATED DATA REQUEST** message included a request for **dedicated** assistance data delivery to the UE, and if the **dedicated** assistance data was successfully **delivered** to the UE, the RNC shall respond to CN with **LOCATION RELATED DATA RESPONSE** message containing no data.

If the **LOCATION RELATED DATA REQUEST** message included a request for **broadcast assistance data deciphering keys**, the RNC shall respond to CN with **LOCATION RELATED DATA RESPONSE** message containing the *Broadcast Assistance Data Deciphering Keys IE*.

8.x.3 Unsuccessful Operation

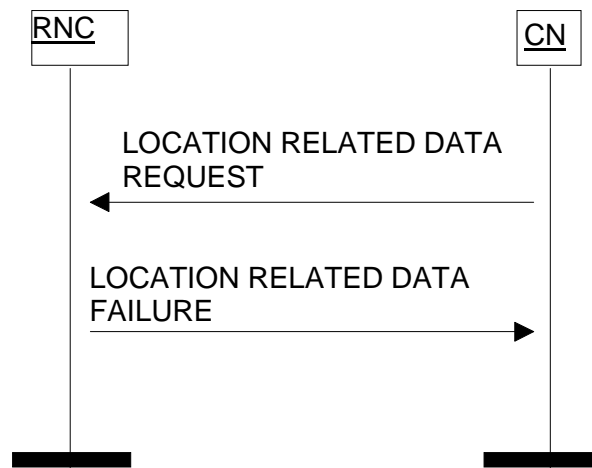


Figure X: Location Related Data procedure. Unsuccessful operation.

If the RNC was not able to successfully deliver the requested dedicated assistance data to the UE, or if the RNC is not able to provide the requested deciphering keys, the RNC shall send LOCATION RELATED DATA FAILURE message including Cause IE to the CN. The Cause IE shall indicate the appropriate cause value to CN, e.g. "Dedicated Assistance data Not Available" or "Deciphering Keys Not Available".

8.x.4 Abnormal Conditions

Not applicable.

9.1.46 RAB MODIFY REQUEST

This message is sent by the RNC to the CN to request modification of one or more RABs for the same UE.

Direction: RNC → CN.

Signalling bearer mode: Connection oriented.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	Ignore
RABs To Be Modified List	M				YES	Ignore
>RABs To Be Modified Item IEs		1 to <maxnoofRABs>			EACH	Ignore
>>RAB ID	M		9.2.1.2	Uniquely identifies the RAB for a specific CN domain, for a particular UE.	-	
>> Requested RAB Parameter Values	M		9.2.1.45	Includes RAB parameters for which different values than what was originally negotiated are being requested.	-	

Range bound	Explanation
maxnoofRABs	Maximum no. of RABs for one UE. Value is 256.

9.1.x1 LOCATION RELATED DATA REQUEST

This message is sent by the CN either to initiate delivery of dedicated assistance data from the RNC to the UE, or to retrieve deciphering keys for the broadcasted assistance data.

Direction: CN → RNC.

Signalling bearer mode: Connection oriented.

IE/Group Name	Presence	Range	IE type and reference	Semantics description	Criticality	Assigned Criticality
Message Type	M		9.2.1.1		YES	reject
Location Related Data Request Type	M		9.2.3.x1		YES	reject

9.1.x2 LOCATION RELATED DATA RESPONSE

This message is sent by the RNC to report the successful response of the LOCATION RELATED DATA REQUEST message.

Direction: RNC → CN.

Signalling bearer mode: Connection oriented.

<u>IE/Group Name</u>	<u>Presence</u>	<u>Range</u>	<u>IE type and reference</u>	<u>Semantics description</u>	<u>Criticality</u>	<u>Assigned Criticality</u>
Message Type	M		9.2.1.1		YES	reject
Broadcast Assistance Data Deciphering Keys	O		9.2.3.x2		YES	ignore

9.1.x3 LOCATION RELATED DATA FAILURE

This message is sent by the RNC to report the unsuccessful response of the LOCATION RELATED DATA REQUEST message.

Direction: RNC → CN.

Signalling bearer mode: Connection oriented.

<u>IE/Group Name</u>	<u>Presence</u>	<u>Range</u>	<u>IE type and reference</u>	<u>Semantics description</u>	<u>Criticality</u>	<u>Assigned Criticality</u>
Message Type	M		9.2.1.1		YES	reject
Cause	M		9.2.1.4		YES	ignore

9.2 Information Element Definitions

9.2.0 General

Section 9.2 presents the RANAP IE definitions in tabular format. The corresponding ASN.1 definition is presented in section 9.3. In case there is contradiction between the tabular format in section 9.2 and the ASN.1 definition, the ASN.1 shall take precedence, except for the definition of conditions for the presence of conditional elements, where the tabular format shall take precedence.

9.2.1 Radio Network Layer Related IEs

9.2.1.1 Message Type

Message Type IE uniquely identifies the message being sent. It is mandatory for all messages.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Message Type				Assumed max no of messages is 256.
>Procedure Code	M		(RAB Assignment, RAB Release Request, lu Release Request, lu Release, Relocation Preparation, Relocation Resource Allocation, Relocation Detect, Relocation Complete Relocation Cancel, SRNS Context Transfer, SRNS Data Forwarding Initiation, SRNS Context Forwarding from Source RNC to CN, SRNS Context Forwarding to Target RNC from CN, Paging, Common ID, CN Invoke Trace, Security Mode Control, Location Reporting Control Location Report, Data Volume Report, Initial UE Message Direct Transfer, Overload Control, Reset, Error Indication, CN Deactivate Trace, RANAP Relocation Information, Reset Resource, ..., RAB Modify Request, Location Related Data)	
>Type of Message	M		CHOICE (Initiating Message, Successful Outcome, Unsuccessful Outcome, Outcome)	

9.2.1.4 Cause

The purpose of the *Cause* IE is to indicate the reason for a particular event for the RANAP protocol.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Choice Cause >Radio Network Layer Cause			INTEGER (RAB pre-empted(1), Trelocoverall Expiry(2), Trelocprep Expiry(3), Treloccomplete Expiry(4), Tqueing Expiry(5), Relocation Triggered(6), Unable to Establish During Relocation(8), Unknown Target RNC(9), Relocation Cancelled(10), Successful Relocation(11), Requested Ciphering and/or Integrity Protection Algorithms not Supported(12), Change of Ciphering and/or Integrity Protection is not supported(13), Failure in the Radio Interface Procedure(14), Release due to UTRAN Generated Reason(15), User Inactivity(16), Time Critical Relocation(17), Requested Traffic Class not Available(18), Invalid RAB Parameters Value(19), Requested	Value range is 1 – 64.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Choice Cause				
			Maximum Bit Rate not Available(20), Requested Maximum Bit Rate for DL not Available(33), Requested Maximum Bit Rate for UL not Available(34), Requested Guaranteed Bit Rate not Available(21), Requested Guaranteed Bit Rate for DL not Available(35), Requested Guaranteed Bit Rate for UL not Available(36), Requested Transfer Delay not Achievable(22), Invalid RAB Parameters Combination(23), Condition Violation for SDU Parameters(24), Condition Violation for Traffic Handling Priority(25), Condition Violation for Guaranteed Bit Rate(26), User Plane Versions not Supported(27), Iu UP Failure(28), TRELAlloc Expiry (7), Relocation Failure in Target CN/RNC or Target System (29), Invalid RAB ID(30),	

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Choice Cause			<p>No remaining RAB(31),</p> <p>Interaction with other procedure(32),</p> <p>Repeated Integrity Checking Failure(37),</p> <p>Requested Report Type not supported(38),</p> <p>Request superseded(39),</p> <p>Release due to UE generated signalling connection release(40),</p> <p>Resource Optimisation Relocation(41),</p> <p>Requested Information Not Available(42),</p> <p>Relocation desirable for radio reasons (43),</p> <p>Relocation not supported in Target RNC or Target system(44),</p> <p>Directed Retry (45),</p> <p>Radio Connection With UE Lost(46)</p> <p>....,</p> <p>RNC unable to establish all RFCs (47).</p> <p>Deciphering Keys Not Available(48).</p> <p>Dedicated Assistance data Not Available(49)</p>	

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Choice Cause				
>Transport Layer Cause			INTEGER (Signalling Transport Resource Failure(65), lu Transport Connection Failed to Establish(66), ...)	Value range is 65 – 80.
>NAS Cause			INTEGER (User Restriction Start Indication(81), User Restriction End Indication(82), Normal Release(83), ...)	Value range is 81 – 96.
>Protocol Cause			INTEGER (Transfer Syntax Error(97), Semantic Error (98), Message not compatible with receiver state (99), Abstract Syntax Error (Reject) (100), Abstract Syntax Error (Ignore and Notify) (101), Abstract Syntax Error (Falsely Constructed Message) (102), ...)	Value range is 97 – 112.
>Miscellaneous Cause			INTEGER (O&M Intervention(113), No Resource Available(114), Unspecified Failure(115), Network Optimisation(116), ...)	Value range is 113 – 128.
>Non-standard Cause			INTEGER	Value range is 129 – 256.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Choice Cause				
			(...)	

The meaning of the different cause values is described in the following table. In general, "not supported" cause values indicate that the concerning capability is missing. On the other hand, "not available" cause values indicate that the concerning capability is present, but insufficient resources were available to perform the requested action.

Radio Network Layer cause	Meaning
Deciphering Keys Not Available	The action failed because RNC is not able to provide requested deciphering keys.
Change Of Ciphering And/Or Integrity Protection Is Not Supported	The UTRAN and/or the UE are/is unable to support the requested change of ciphering and/or integrity protection algorithms.
Condition Violation For Guaranteed Bit Rate	The action was not performed due to condition violation for guaranteed bit rate.
Condition Violation For SDU Parameters	The action was not performed due to condition violation for SDU parameters.
Condition Violation For Traffic Handling Priority	The action was not performed due to condition violation for traffic handling priority.
Dedicated Assistance data Not Available	The action failed because RNC is not able to successfully deliver the requested dedicated assistance data to the UE.
Directed Retry	The reason for action is Directed Retry
Failure In The Radio Interface Procedure	Radio interface procedure has failed.
Interaction With Other Procedure	Relocation was cancelled due to interaction with other procedure.
Invalid RAB ID	The action failed because the RAB ID is unknown in the RNC.
Invalid RAB Parameters Combination	The action failed due to invalid RAB parameters combination.
Invalid RAB Parameters Value	The action failed due to invalid RAB parameters value.
Iu UP Failure	The action failed due to Iu UP failure.
No remaining RAB	The reason for the action is no remaining RAB.
RAB Pre-empted	The reason for the action is that RAB is pre-empted.
Radio Connection With UE Lost	The action is requested due to losing radio connection to the UE
Release Due To UE Generated Signalling Connection Release	Release requested due to UE generated signalling connection release.
Release Due To UTRAN Generated Reason	Release is initiated due to UTRAN generated reason.
Relocation Cancelled	The reason for the action is relocation cancellation.
Relocation Desirable for Radio Reasons	The reason for requesting relocation is radio related.
Relocation Failure In Target CN/RNC Or Target System	Relocation failed due to a failure in target CN/RNC or target system.
Relocation Not Supported In Target RNC Or Target System	Relocation failed because relocation was not supported in target RNC or target system.
Relocation Triggered	The action failed due to relocation.
Repeated Integrity Checking Failure	The action is requested due to repeated failure in integrity checking.
Request Superseded	The action failed because there was a second request on the same RAB.
Requested Ciphering And/Or Integrity Protection Algorithms Not Supported	The UTRAN or the UE is unable to support the requested ciphering and/or integrity protection algorithms.
Requested Guaranteed Bit Rate For DL Not Available	The action failed because requested guaranteed bit rate for DL is not available.
Requested Guaranteed Bit Rate For UL Not Available	The action failed because requested guaranteed bit rate for UL is not available.
Requested Guaranteed Bit Rate Not Available	The action failed because requested guaranteed bit rate is not available.
Requested Information Not Available	The action failed because requested information is not available.
Requested Maximum Bit Rate For DL Not Available	The action failed because requested maximum bit rate for DL is not available.
Requested Maximum Bit Rate For UL Not Available	The action failed because requested maximum bit rate for UL is not available.
Requested Maximum Bit Rate Not Available	The action failed because requested maximum bit rate is not available.
Requested Report Type Not Supported	The RNC is not supporting the requested location report type.
Requested Traffic Class Not Available	The action failed because requested traffic class is not available.
Requested Transfer Delay Not Achievable	The action failed because requested transfer delay is not achievable.

Resource Optimisation Relocation	The reason for requesting relocation is resource optimisation.
Successful Relocation	The reason for the action is completion of successful relocation.
Time Critical Relocation	Relocation is requested for time critical reason.
T _{QUEUEING} Expiry	The action failed due to expiry of the timer T _{QUEUEING} .
T _{RELOCalloc} Expiry	Relocation Resource Allocation procedure failed due to expiry of the timer T _{RELOCalloc} .
T _{RELOCcomplete} Expiry	The reason for the action is expiry of timer T _{RELOCcomplete} .
T _{RELOCoverall} Expiry	The reason for the action is expiry of timer T _{RELOCoverall} .
T _{RELOCprep} Expiry	Relocation Preparation procedure is cancelled when timer T _{RELOCprep} expires.
Unable To Establish During Relocation	RAB failed to establish during relocation because it cannot be supported in the target RNC.
Unknown Target RNC	Relocation rejected because the target RNC is not known to the CN.
User Inactivity	The action is requested due to user inactivity.
User Plane Versions Not Supported	The action failed because requested user plane versions were not supported.
RNC unable to establish all RFCs	RNC couldn't establish all RAB subflow combinations indicated within the <i>RAB Parameters</i> IE.

Transport Layer cause	Meaning
Iu Transport Connection Failed to Establish	The action failed because the Iu Transport Network Layer connection could not be established.
Signalling Transport Resource Failure	Signalling transport resources have failed (<i>e.g. processor reset</i>).

NAS cause	Meaning
Normal Release	The release is normal.
User Restriction Start Indication	A location report is generated due to entering a classified area set by O&M.
User Restriction End Indication	A location report is generated due to leaving a classified area set by O&M.

Protocol cause	Meaning
Abstract Syntax Error (Reject)	The received message included an abstract syntax error and the concerning criticality indicated "reject".
Abstract Syntax Error (Ignore And Notify)	The received message included an abstract syntax error and the concerning criticality indicated "ignore and notify".
Abstract Syntax Error (Falsely Constructed Message)	The received message contained IEs or IE groups in wrong order or with too many occurrences.
Message Not Compatible With Receiver State	The received message was not compatible with the receiver state.
Semantic Error	The received message included a semantic error.
Transfer Syntax Error	The received message included a transfer syntax error.

Miscellaneous cause	Meaning
Network Optimisation	The action is performed for network optimisation.
No Resource Available	No requested resource is available.
O&M Intervention	The action is due to O&M intervention.
Unspecified Failure	Sent when none of the specified cause values applies.

9.2.1.16 Request Type

This element indicates the type of UE location to be reported from RNC and it is either a Service Area or geographical co-ordinates.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
Request Type				
>Event	M		ENUMERATED(Stop Change of service area, Direct, Change of service area, ...)	
>Report Area	M		ENUMERATED(Service Area, Geographical Coordinates, ...)	When the Event IE is set to "Stop Change of service area", the value of the Report area IE shall be the same as in the LOCATION REPORTING CONTROL message that initiated the location reporting.
> <u>Horizontal Accuracy Code</u>	C – ifGeoCoordandAccuracy		INTEGER(0...127)	The requested accuracy "r" is derived from the "accuracy code" k by $r = 10 \times (1.1^k - 1)$
> <u>Vertical Accuracy Code</u>	C – ifGeoCoordandAccuracy		INTEGER(0...127)	<u>The requested accuracy "r" is derived from the "accuracy code" k by $r = 10 \times (1.1^k - 1)$</u>
> <u>Response time</u>	C – ifDirect		ENUMERATED(Low Delay, Delay Tolerant, ...)	
> <u>Positioning Priority</u>	C – ifDirect&ChangeArea		ENUMERATED(High Priority, Normal Priority, ...)	
> <u>Client type</u>	C – ifDirect		ENUMERATED(Emergency Services, Value Added Services, PLMN Operator Services, Lawful Intercept Services, ...)	<u>Identifies the type of client</u>

Condition	Explanation
IfGeoCoordandAccuracy	To be used if Geographical Coordinates shall be reported with a requested accuracy.
<u>IfDirect</u>	<u>This IE shall be present if the <i>Event</i> IE is set to 'Direct'.</u>
<u>IfDirect&ChangeArea</u>	<u>This IE shall be present if the <i>Event</i> IE is set to 'Direct' or "Change of Service Area".</u>

9.2.3.18 NAS Synchronisation Indicator

This information element contains transparent NAS information that is transferred without interpretation in the RNC.

IE/Group Name	Presence	Range	IE type and reference	Semantics description
NAS Synchronisation Indicator	M		BIT STRING (4)	

9.2.3.x1 Location Related Data Request Type

This element indicates the type of the requested location related data for the indicated positioning method, and provides the assistance data for the Assisted GPS positioning method.

<u>IE/Group Name</u>	<u>Presence</u>	<u>Range</u>	<u>IE type and reference</u>	<u>Semantics description</u>
<u>Location Related Data Request Type</u>				
<u>>Requested Location Related Data Type</u>	<u>M</u>		<u>ENUMERATED(Deciphering Keys for UE Based OTDOA, Deciphering Keys for Assisted GPS, Dedicated Assistance Data for UE Based OTDOA, Dedicated Assistance Data for Assisted GPS, ...)</u>	
<u>>Requested GPS Assistance Data</u>	<u>C – ifDedAssGPS</u>		<u>9.2.3.x3</u>	

<u>Condition</u>	<u>Explanation</u>
<u>ifDedAssGPS</u>	<u>This IE shall be present if the Requested Location Related Data Type IE is set to 'Dedicated Assistance Data for Assisted GPS'.</u>

9.2.3.x2 Broadcast Assistance Data Deciphering keys

This information element is used for indicating the deciphering keys that will be used by the UE for deciphering of assistance data broadcast.

<u>IE/Group Name</u>	<u>Presence</u>	<u>Range</u>	<u>IE type and reference</u>	<u>Semantics description</u>
<u>Broadcast Assistance Data Deciphering keys</u>				
<u>> Ciphering Key Flag</u>	<u>M</u>		<u>BIT STRING (SIZE(1))</u>	<u>Indicates the current Ciphering Key Flag that is used for the assistance data broadcast messages in the location area.</u>
<u>>Current Deciphering key</u>	<u>M</u>		<u>BIT STRING (SIZE(56))</u>	<u>Current deciphering key that is used for deciphering assistance data.</u>
<u>>Next Deciphering key</u>	<u>M</u>		<u>BIT STRING (SIZE(56))</u>	<u>Next deciphering key that will be used for deciphering assistance data.</u>

9.2.3.x3 Requested GPS Assistance Data

This information element is used for indicating the requested GPS assistance data.

This IE is transparent to CN.

<u>IE/Group Name</u>	<u>Presence</u>	<u>Range</u>	<u>IE type and reference</u>	<u>Semantics description</u>
<u>Requested GPS Assistance Data</u>			<u>OCTET STRING (SIZE(1..38))</u>	<u>For the corresponding Information Element Definition see "gpsAssistanceData" [22].</u>

9.3.2 Elementary Procedure Definitions

```
-- *****
--
-- Elementary Procedure definitions
--
-- *****

RANAP-PDU-Descriptions {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
umts-Access (20) modules (3) ranap (0) version1 (1) ranap-PDU-Descriptions (0)}

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- *****
--
-- IE parameter types from other modules.
--
-- *****

IMPORTS
    Criticality,
    ProcedureCode
FROM RANAP-CommonDataTypes

    Iu-ReleaseCommand,
    Iu-ReleaseComplete,
    RelocationCommand,
    RelocationPreparationFailure,
    RelocationRequired,
    RelocationRequest,
    RelocationRequestAcknowledge,
    RelocationFailure,
    RelocationCancel,
    RelocationCancelAcknowledge,
    SRNS-ContextRequest,
    SRNS-ContextResponse,
    SecurityModeCommand,
    SecurityModeComplete,
    SecurityModeReject,
    DataVolumeReportRequest,
    DataVolumeReport,
    Reset,
    ResetAcknowledge,
    RAB-ReleaseRequest,
    Iu-ReleaseRequest,
    RelocationDetect,
    RelocationComplete,
```

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Paging,
CommonID,
CN-InvokeTrace,
CN-DeactivateTrace,
LocationReportingControl,
LocationReport,
InitialUE-Message,
DirectTransfer,
Overload,
ErrorIndication,
SRNS-DataForwardCommand,
ForwardSRNS-Context,
RAB-AssignmentRequest,
RAB-AssignmentResponse,
RAB-ModifyRequest,
PrivateMessage,
ResetResource,
ResetResourceAcknowledge,
RANAP-RelocationInformation,
LocationRelatedDataRequest,
LocationRelatedDataResponse,
LocationRelatedDataFailure
FROM RANAP-PDU-Contents

id-LocationRelatedData,
id-CN-DeactivateTrace,
id-CN-InvokeTrace,
id-CommonID,
id-DataVolumeReport,
id-DirectTransfer,
id-ErrorIndication,
id-ForwardSRNS-Context,
id-InitialUE-Message,
id-Iu-Release,
id-Iu-ReleaseRequest,
id-LocationReport,
id-LocationReportingControl,
id-OverloadControl,
id-Paging,
id-privateMessage,
id-RAB-Assignment,
id-RAB-ReleaseRequest,
id-RAB-ModifyRequest,
id-RANAP-Relocation,
id-RelocationCancel,
id-RelocationComplete,
id-RelocationDetect,
id-RelocationPreparation,
id-RelocationResourceAllocation,
id-Reset,
id-SRNS-ContextTransfer,

```

    id-SRNS-DataForward,
    id-SecurityModeControl,
    id-ResetResource
FROM RANAP-Constants;

-- *****
--
-- Interface Elementary Procedure Class
--
-- *****

RANAP-ELEMENTARY-PROCEDURE ::= CLASS {
    &InitiatingMessage          ,
    &SuccessfulOutcome          OPTIONAL,
    &UnsuccessfulOutcome        OPTIONAL,
    &Outcome                    OPTIONAL,
    &procedureCode              ProcedureCode  UNIQUE,
    &criticality                Criticality    DEFAULT ignore
}
WITH SYNTAX {
    INITIATING MESSAGE          &InitiatingMessage
    [SUCCESSFUL OUTCOME         &SuccessfulOutcome]
    [UNSUCCESSFUL OUTCOME       &UnsuccessfulOutcome]
    [OUTCOME                    &Outcome]
    PROCEDURE CODE              &procedureCode
    [CRITICALITY                &criticality]
}

-- *****
--
-- Interface PDU Definition
--
-- *****

RANAP-PDU ::= CHOICE {
    initiatingMessage  InitiatingMessage,
    successfulOutcome  SuccessfulOutcome,
    unsuccessfulOutcome UnsuccessfulOutcome,
    outcome            Outcome,
    ...
}

InitiatingMessage ::= SEQUENCE {
    procedureCode  RANAP-ELEMENTARY-PROCEDURE.&procedureCode  ({RANAP-ELEMENTARY-PROCEDURES}),
    criticality   RANAP-ELEMENTARY-PROCEDURE.&criticality      ({RANAP-ELEMENTARY-PROCEDURES}{@procedureCode}),
    value        RANAP-ELEMENTARY-PROCEDURE.&InitiatingMessage ({RANAP-ELEMENTARY-PROCEDURES}{@procedureCode})
}

SuccessfulOutcome ::= SEQUENCE {
    procedureCode  RANAP-ELEMENTARY-PROCEDURE.&procedureCode  ({RANAP-ELEMENTARY-PROCEDURES}),
    criticality   RANAP-ELEMENTARY-PROCEDURE.&criticality      ({RANAP-ELEMENTARY-PROCEDURES}{@procedureCode}),
}

```


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```

    value          RANAP-ELEMENTARY-PROCEDURE.&SuccessfulOutcome  ({RANAP-ELEMENTARY-PROCEDURES}{@procedureCode})
  }

```

```

UnsuccessfulOutcome ::= SEQUENCE {
  procedureCode  RANAP-ELEMENTARY-PROCEDURE.&procedureCode  ({RANAP-ELEMENTARY-PROCEDURES}),
  criticality    RANAP-ELEMENTARY-PROCEDURE.&criticality      ({RANAP-ELEMENTARY-PROCEDURES}{@procedureCode}),
  value         RANAP-ELEMENTARY-PROCEDURE.&UnsuccessfulOutcome ({RANAP-ELEMENTARY-PROCEDURES}{@procedureCode})
}

```

```

Outcome ::= SEQUENCE {
  procedureCode  RANAP-ELEMENTARY-PROCEDURE.&procedureCode  ({RANAP-ELEMENTARY-PROCEDURES}),
  criticality    RANAP-ELEMENTARY-PROCEDURE.&criticality      ({RANAP-ELEMENTARY-PROCEDURES}{@procedureCode}),
  value         RANAP-ELEMENTARY-PROCEDURE.&Outcome          ({RANAP-ELEMENTARY-PROCEDURES}{@procedureCode})
}

```

```

-- *****
--
-- Interface Elementary Procedure List
--
-- *****

```

```

RANAP-ELEMENTARY-PROCEDURES RANAP-ELEMENTARY-PROCEDURE ::= {
  RANAP-ELEMENTARY-PROCEDURES-CLASS-1 |
  RANAP-ELEMENTARY-PROCEDURES-CLASS-2 |
  RANAP-ELEMENTARY-PROCEDURES-CLASS-3 ,
  ...
}

```

```

RANAP-ELEMENTARY-PROCEDURES-CLASS-1 RANAP-ELEMENTARY-PROCEDURE ::= {
  iu-Release          |
  relocationPreparation      |
  relocationResourceAllocation  |
  relocationCancel      |
  sRNS-ContextTransfer  |
  securityModeControl  |
  dataVolumeReport      |
  reset                |
  resetResource        ,
  ...
  locationRelatedData
}

```

Lots of unaffected ASN1 in 9.3.2 not shown

```

rAB-ModifyRequest RANAP-ELEMENTARY-PROCEDURE ::= {
  INITIATING MESSAGE  RAB-ModifyRequest
  PROCEDURE CODE      id-RAB-ModifyRequest
  CRITICALITY         ignore
}

```

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```
LocationRelatedData RANAP-ELEMENTARY-PROCEDURE ::= {  
  INITIATING MESSAGE      LocationRelatedDataRequest  
  SUCCESSFUL OUTCOME      LocationRelatedDataResponse  
  UNSUCCESSFUL OUTCOME    LocationRelatedDataFailure  
  PROCEDURE CODE          id-LocationRelatedData  
  CRITICALITY              reject  
}
```

END

9.3.3 PDU Definitions

```
-- *****
--
-- PDU definitions for RANAP.
--
-- *****

RANAP-PDU-Contents {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
umts-Access (20) modules (3) ranap (0) version1 (1) ranap-PDU-Contents (1) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- *****
--
-- IE parameter types from other modules.
--
-- *****

IMPORTS
    BroadcastAssistanceDataDecipheringKeys,
    LocationRelatedDataRequestType,
    DataVolumeReference,
    AreaIdentity,
    CN-DomainIndicator,
    Cause,
    CriticalityDiagnostics,
    ChosenEncryptionAlgorithm,
    ChosenIntegrityProtectionAlgorithm,
    ClassmarkInformation2,
    ClassmarkInformation3,
    DL-GTP-PDU-SequenceNumber,
    DL-N-PDU-SequenceNumber,
    DataVolumeReportingIndication,
    DRX-CycleLengthCoefficient,
    EncryptionInformation,
    GlobalRNC-ID,
    IntegrityProtectionInformation,
    IuSignallingConnectionIdentifier,
    IuTransportAssociation,
    KeyStatus,
    L3-Information,
    LAI,
    NAS-PDU,
    NAS-SynchronisationIndicator,
    NonSearchingIndication,
    NumberOfSteps,
```

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OMC-ID,
OldBSS-ToNewBSS-Information,
PagingAreaID,
PagingCause,
PDP-TypeInformation,
PermanentNAS-UE-ID,
RAB-ID,
RAB-Parameters,
RAC,
RelocationType,
RequestType,
Requested-RAB-Parameter-Values,
SAI,
SAPI,
Service-Handover,
SourceID,
SourceRNC-ToTargetRNC-TransparentContainer,
TargetID,
TargetRNC-ToSourceRNC-TransparentContainer,
TemporaryUE-ID,
TraceReference,
TraceType,
UnsuccessfullyTransmittedDataVolume,
TransportLayerAddress,
TriggerID,
UE-ID,
UL-GTP-PDU-SequenceNumber,
UL-N-PDU-SequenceNumber,
UP-ModeVersions,
UserPlaneMode,
Alt-RAB-Parameters,
Ass-RAB-Parameters

FROM RANAP-IES

PrivateIE-Container {},
ProtocolExtensionContainer {},
ProtocolIE-ContainerList {},
ProtocolIE-ContainerPair {},
ProtocolIE-ContainerPairList {},
ProtocolIE-Container {},
RANAP-PRIVATE-IES,
RANAP-PROTOCOL-EXTENSION,
RANAP-PROTOCOL-IES,
RANAP-PROTOCOL-IES-PAIR

FROM RANAP-Containers

maxNrOfDTs,
maxNrOfErrors,
maxNrOfIuSigConIds,
maxNrOfRABs,

maxNrOfVol ,

id-AreaIdentity ,
id-Alt-RAB-Parameters ,
id-Ass-RAB-Parameters ,
id-BroadcastAssistanceDataDecipheringKeys ,
id-LocationRelatedDataRequestType ,
id-CN-DomainIndicator ,
id-Cause ,
id-ChosenEncryptionAlgorithm ,
id-ChosenIntegrityProtectionAlgorithm ,
id-ClassmarkInformation2 ,
id-ClassmarkInformation3 ,
id-CriticalityDiagnostics ,
id-DRX-CycleLengthCoefficient ,
id-DirectTransferInformationItem-RANAP-RelocInf ,
id-DirectTransferInformationList-RANAP-RelocInf ,
id-DL-GTP-PDU-SequenceNumber ,
id-EncryptionInformation ,
id-GlobalRNC-ID ,
id-IntegrityProtectionInformation ,
id-IuSigConId ,
id-IuSigConIdItem ,
id-IuSigConIdList ,
id-IuTransportAssociation ,
id-KeyStatus ,
id-L3-Information ,
id-LAI ,
id-NAS-PDU ,
id-NonSearchingIndication ,
id-NumberOfSteps ,
id-OMC-ID ,
id-OldBSS-ToNewBSS-Information ,
id-PagingAreaID ,
id-PagingCause ,
id-PermanentNAS-UE-ID ,
id-RAB-ContextItem ,
id-RAB-ContextList ,
id-RAB-ContextFailedtoTransferItem ,
id-RAB-ContextFailedtoTransferList ,
id-RAB-ContextItem-RANAP-RelocInf ,
id-RAB-ContextList-RANAP-RelocInf ,
id-RAB-DataForwardingItem ,
id-RAB-DataForwardingItem-SRNS-CtxReq ,
id-RAB-DataForwardingList ,
id-RAB-DataForwardingList-SRNS-CtxReq ,
id-RAB-DataVolumeReportItem ,
id-RAB-DataVolumeReportList ,
id-RAB-DataVolumeReportRequestItem ,
id-RAB-DataVolumeReportRequestList ,
id-RAB-FailedItem ,

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```

id-RAB-FailedList,
id-RAB-FailedtoReportItem,
id-RAB-FailedtoReportList,
id-RAB-ID,
id-RAB-ModifyList,
id-RAB-ModifyItem,
id-RAB-QueuedItem,
id-RAB-QueuedList,
id-RAB-ReleaseFailedList,
id-RAB-ReleaseItem,
id-RAB-ReleasedItem-IuRelComp,
id-RAB-ReleaseList,
id-RAB-ReleasedItem,
id-RAB-ReleasedList,
id-RAB-ReleasedList-IuRelComp,
id-RAB-RelocationReleaseItem,
id-RAB-RelocationReleaseList,
id-RAB-SetupItem-RelocReq,
id-RAB-SetupItem-RelocReqAck,
id-RAB-SetupList-RelocReq,
id-RAB-SetupList-RelocReqAck,
id-RAB-SetupOrModifiedItem,
id-RAB-SetupOrModifiedList,
id-RAB-SetupOrModifyItem,
id-RAB-SetupOrModifyList,
id-RAC,
id-RelocationType,
id-RequestType,
id-SAI,
id-SAPI,
id-SourceID,
id-SourceRNC-ToTargetRNC-TransparentContainer,
id-TargetID,
id-TargetRNC-ToSourceRNC-TransparentContainer,
id-TemporaryUE-ID,
id-TraceReference,
id-TraceType,
id-TransportLayerAddress,
id-TriggerID,
id-UE-ID,
id-UL-GTP-PDU-SequenceNumber
FROM RANAP-Constants;

```

Lots of unaffected ASN1 in 9.3.3 not shown
--

```

-- *****
--
-- RAB MODIFICATION REQUEST ELEMENTARY PROCEDURE
--
-- *****

```

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```
-- *****
--
-- RAB Modify Request
--
-- *****

RAB-ModifyRequest ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { {RAB-ModifyRequestIEs} },
    protocolExtensions   ProtocolExtensionContainer { {RAB-ModifyRequestExtensions} }          OPTIONAL,
    ...
}

RAB-ModifyRequestIEs RANAP-PROTOCOL-IES ::= {
    { ID id-RAB-ModifyList          CRITICALITY ignore TYPE RAB-ModifyList          PRESENCE mandatory},
    ...
}

RAB-ModifyList          ::= RAB-IE-ContainerList { {RAB-ModifyItemIEs} }

RAB-ModifyItemIEs RANAP-PROTOCOL-IES ::= {
    { ID id-RAB-ModifyItem          CRITICALITY ignore TYPE RAB-ModifyItem          PRESENCE mandatory },
    ...
}

RAB-ModifyItem ::= SEQUENCE {
    rAB-ID                RAB-ID,
    requested-RAB-Parameter-Values Requested-RAB-Parameter-Values,
    iE-Extensions         ProtocolExtensionContainer { {RAB-ModifyItem-ExtIEs} }          OPTIONAL,
    ...
}

RAB-ModifyItem-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

RAB-ModifyRequestExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- LOCATION RELATED DATA ELEMENTARY PROCEDURE
--
-- *****
--
-- *****
--
-- Location Related Data Request
--
-- *****
```

```

LocationRelatedDataRequest ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { { LocationRelatedDataRequestIEs } },
    protocolExtensions   ProtocolExtensionContainer { { LocationRelatedDataRequestExtensions } }          OPTIONAL,
    ...
}

LocationRelatedDataRequestIEs RANAP-PROTOCOL-IES ::= {
    { ID id-LocationRelatedDataRequestType          CRITICALITY reject TYPE LocationRelatedDataRequestType          PRESENCE mandatory },
    ...
}

LocationRelatedDataRequestExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- Location Related Data Response
--
-- *****

LocationRelatedDataResponse ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { { LocationRelatedDataResponseIEs } },
    protocolExtensions   ProtocolExtensionContainer { { LocationRelatedDataResponseExtensions } }          OPTIONAL,
    ...
}

LocationRelatedDataResponseIEs RANAP-PROTOCOL-IES ::= {
    { ID id-BroadcastAssistanceDataDecipheringKeys          CRITICALITY ignore TYPE BroadcastAssistanceDataDecipheringKeys          PRESENCE OPTIONAL },
    ...
}

LocationRelatedDataResponseExtensions RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

-- *****
--
-- Location Related Data Failure
--
-- *****

LocationRelatedDataFailure ::= SEQUENCE {
    protocolIEs          ProtocolIE-Container          { { LocationRelatedDataFailureIEs } },
    protocolExtensions   ProtocolExtensionContainer { { LocationRelatedDataFailureExtensions } }          OPTIONAL,
    ...
}

LocationRelatedDataFailureIEs RANAP-PROTOCOL-IES ::= {
    { ID id-Cause          CRITICALITY ignore TYPE Cause          PRESENCE mandatory },
    ...
}

```


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```
}  
LocationRelatedDataFailureExtensions RANAP-PROTOCOL-EXTENSION ::= {  
  ...  
}
```

END

9.3.4 Information Element Definitions

```
-- *****
--
-- Information Element Definitions
--
-- *****

RANAP-IEs {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
umts-Access (20) modules (3) ranap (0) version1 (1) ranap-IEs (2) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

IMPORTS
    maxNrOfErrors,
    maxNrOfPDPDirections,
    maxNrOfPoints,
    maxNrOfRABs,
    maxNrOfSeparateTrafficDirections,
    maxRAB-Subflows,
    maxRAB-SubflowCombination,
    maxNrOfLevels,
    maxNrOfAltValues,

    id-MessageStructure,
    id-TypeOfError

FROM RANAP-Constants

    Criticality,
    ProcedureCode,
    ProtocolIE-ID,
    TriggeringMessage
FROM RANAP-CommonDataTypes

    ProtocolExtensionContainer{},
    RANAP-PROTOCOL-EXTENSION
FROM RANAP-Containers;
```

Lots of unaffected ASN1 in 9.3.4 not shown

```
AreaIdentity ::= CHOICE {
    sAI          SAI,
    geographicalArea    GeographicalArea,
```

```

}
...
}
Ass-RAB-Parameters ::= SEQUENCE {
    assMaxBitrateInf          Ass-RAB-Parameter-MaxBitrateList          OPTIONAL
    -- This IE is only present when RAB QoS Negotiation has been performed for the RAB Parameter in question --,
    assGuaranteedBitRateInf   Ass-RAB-Parameter-GuaranteedBitrateList   OPTIONAL
    -- This IE is only present when RAB QoS Negotiation has been performed for the RAB Parameter in question --,
    iE-Extensions            ProtocolExtensionContainer { {Ass-RAB-Parameters-ExtIEs} } OPTIONAL,
    ...
}

Ass-RAB-Parameters-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

Ass-RAB-Parameter-GuaranteedBitrateList ::= SEQUENCE (SIZE (1..maxNrOfSeparateTrafficDirections)) OF GuaranteedBitrate

Ass-RAB-Parameter-MaxBitrateList ::= SEQUENCE (SIZE (1..maxNrOfSeparateTrafficDirections)) OF MaxBitrate

-- B

BindingID                ::= OCTET STRING (SIZE (4))

BroadcastAssistanceDataDecipheringKeys ::= SEQUENCE {
    cipheringKeyFlag       BIT STRING (SIZE (1)),
    currentDecipheringKey  BIT STRING (SIZE (56)),
    nextDecipheringKey     BIT STRING (SIZE (56)),
    ...
}

-- C

Cause ::= CHOICE {
    radioNetwork          CauseRadioNetwork,
    transmissionNetwork   CauseTransmissionNetwork,
    nAS                   CauseNAS,
    protocol              CauseProtocol,
    misc                  CauseMisc,
    non-Standard         CauseNon-Standard,
    ...
}

CauseMisc ::= INTEGER {
    om-intervention (113),
    no-resource-available (114),
    unspecified-failure (115),
    network-optimisation (116)
}

```

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} (113..128)

```
CauseNAS ::= INTEGER {  
    user-restriction-start-indication (81),  
    user-restriction-end-indication (82),  
    normal-release (83)
```

} (81..96)

```
CauseProtocol ::= INTEGER {  
    transfer-syntax-error (97),  
    semantic-error (98),  
    message-not-compatible-with-receiver-state (99),  
    abstract-syntax-error-reject (100),  
    abstract-syntax-error-ignore-and-notify (101),  
    abstract-syntax-error-falsely-constructed-message (102)
```

} (97..112)

```
CauseRadioNetwork ::= INTEGER {  
    rab-pre-empted (1),  
    trelocoverall-expiry (2),  
    trelocprep-expiry (3),  
    treloccomplete-expiry (4),  
    tqueing-expiry (5),  
    relocation-triggered (6),  
    trellocalloc-expiry(7),  
    unable-to-establish-during-relocation (8),  
    unknown-target-rnc (9),  
    relocation-cancelled (10),  
    successful-relocation (11),  
    requested-ciphering-and-or-integrity-protection-algorithms-not-supported (12),  
    change-of-ciphering-and-or-integrity-protection-is-not-supported (13),  
    failure-in-the-radio-interface-procedure (14),  
    release-due-to-utran-generated-reason (15),  
    user-inactivity (16),  
    time-critical-relocation (17),  
    requested-traffic-class-not-available (18),  
    invalid-rab-parameters-value (19),  
    requested-maximum-bit-rate-not-available (20),  
    requested-guaranteed-bit-rate-not-available (21),  
    requested-transfer-delay-not-achievable (22),  
    invalid-rab-parameters-combination (23),  
    condition-violation-for-sdu-parameters (24),  
    condition-violation-for-traffic-handling-priority (25),  
    condition-violation-for-guaranteed-bit-rate (26),  
    user-plane-versions-not-supported (27),  
    iu-up-failure (28),  
    relocation-failure-in-target-CN-RNC-or-target-system(29),  
    invalid-RAB-ID (30),  
    no-remaining-rab (31),  
    interaction-with-other-procedure (32),
```

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```
requested-maximum-bit-rate-for-dl-not-available (33),
requested-maximum-bit-rate-for-ul-not-available (34),
requested-guaranteed-bit-rate-for-dl-not-available (35),
requested-guaranteed-bit-rate-for-ul-not-available (36),
repeated-integrity-checking-failure (37),
requested-report-type-not-supported (38),
request-superseded (39),
release-due-to-UE-generated-signalling-connection-release (40),
resource-optimisation-relocation (41),
requested-information-not-available (42),
relocation-desirable-for-radio-reasons (43),
relocation-not-supported-in-target-RNC-or-target-system (44),
directed-retry (45),
radio-connection-with-UE-Lost (46),
RNC-unable-to-establish-all-RFCs (47),
deciphering-keys-not-available(48),
dedicated-assistance-data-not-available(49)
} (1..64)

CauseNon-Standard ::= INTEGER (129..256)

CauseTransmissionNetwork ::= INTEGER {
    signalling-transport-resource-failure (65),
    iu-transport-connection-failed-to-establish (66)
} (65..80)

ClientType ::= ENUMERATED {
    emergency-Services,
    value-Added-Services,
    pLMN-Operator-Services,
    lawful-Intercept-Services,
    ...
}

CriticalityDiagnostics ::= SEQUENCE {
    procedureCode          ProcedureCode          OPTIONAL,
    triggeringMessage      TriggeringMessage      OPTIONAL,
    procedureCriticality   Criticality             OPTIONAL,
    iEsCriticalityDiagnostics CriticalityDiagnostics-IE-List OPTIONAL,
    iE-Extensions         ProtocolExtensionContainer { {CriticalityDiagnostics-ExtIEs} } OPTIONAL,
    ...
}

-- L

LAC ::= OCTET STRING (SIZE (2))

LAI ::= SEQUENCE {
```

Lots of unaffected ASN1 in 9.3.4 not shown

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```

    pLMNIdentity          PLMNIdentity,
    LAC                   LAC,
    iE-Extensions         ProtocolExtensionContainer { {LAI-ExtIEs} } OPTIONAL
}

```

```

LAI-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
    ...
}

```

```

LocationRelatedDataRequestType ::= SEQUENCE {
    requestedLocationRelatedDataType          RequestedLocationRelatedDataType,
    requestedGPSAssistanceData              RequestedGPSAssistanceData OPTIONAL,
    -- This IE shall be present if the Requested Location Related Data Type IE is set to 'Dedicated Assistance Data for Assisted GPS' --
    ...
}

```

```

L3-Information          ::= OCTET STRING

```

```

-- M

```

Lots of unaffected ASN1 in 9.3.4 not shown

```

PermittedIntegrityProtectionAlgorithms ::= SEQUENCE (SIZE (1..16)) OF
    IntegrityProtectionAlgorithm

```

```

PLMNIdentity          ::= TBCD-STRING (SIZE (3))

```

```

PositioningPriority ::= ENUMERATED {
    high-Priority,
    normal-Priority,
    ...
}

```

```

Pre-emptionCapability ::= ENUMERATED {
    shall-not-trigger-pre-emption,
    may-trigger-pre-emption
}

```

Lots of unaffected ASN1 in 9.3.4 not shown

```

ReportArea ::= ENUMERATED {
    service-area,
    geographical-coordinates,
    ...
}

```

```

RequestedGPSAssistanceData ::= OCTET STRING (SIZE (1 .. 38 ))
    -- gpsAssistanceData as defined in 24.080 --

```

```

RequestedLocationRelatedDataType ::= ENUMERATED {

```

```

decipheringKeysUEBasedOTDOA,
decipheringKeysAssistedGPS,
dedicatedAssistanceDataUEBasedOTDOA,
dedicatedAssistanceDataAssistedGPS,
...
]

Requested-RAB-Parameter-Values ::= SEQUENCE {
  requestedMaxBitrates           Requested-RAB-Parameter-MaxBitrateList           OPTIONAL
  -- This IE is only present when a different value is being requested for the RAB Parameter --,
  requestedGuaranteedBitrates    Requested-RAB-Parameter-GuaranteedBitrateList    OPTIONAL
  -- This IE is only present when a different value is being requested for the RAB Parameter --,
  iE-Extensions                 ProtocolExtensionContainer { { Requested-RAB-Parameter-Values-ExtIEs } } OPTIONAL,
  ...
}

Requested-RAB-Parameter-Values-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
  ...
}

Requested-RAB-Parameter-MaxBitrateList ::= SEQUENCE (SIZE (1..maxNrOfSeparateTrafficDirections)) OF MaxBitrate

Requested-RAB-Parameter-GuaranteedBitrateList ::= SEQUENCE (SIZE (1..maxNrOfSeparateTrafficDirections)) OF GuaranteedBitrate

RequestType ::= SEQUENCE {
  event           Event,
  reportArea      ReportArea,
  horizontalAccuracyCode    INTEGER (0..127)    OPTIONAL,
  -- To be used if Geographical Coordinates shall be reported with a requested accuracy. --
  ...
  verticalAccuracyCode      INTEGER (0..127)    OPTIONAL,
  -- To be used if Geographical Coordinates shall be reported with a requested accuracy. --
  responseTime              ResponseTime    OPTIONAL,
  -- This IE shall be present if the Event IE is set to 'Direct' --
  positioningPriority        PositioningPriority OPTIONAL,
  -- This IE shall be present if the Event IE is set to 'Direct' or "Change of Service Area". --
  clientType                ClientType    OPTIONAL
  -- This IE shall be present if the Event IE is set to 'Direct'. --
}

ResidualBitErrorRatio ::= SEQUENCE {
  mantissa        INTEGER (1..9),
  exponent        INTEGER (1..8),
  iE-Extensions   ProtocolExtensionContainer { {ResidualBitErrorRatio-ExtIEs} } OPTIONAL
}
-- ResidualBitErrorRatio = mantissa * 10^-exponent

ResidualBitErrorRatio-ExtIEs RANAP-PROTOCOL-EXTENSION ::= {
  ...
}

```

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```
ResponseTime ::= ENUMERATED {  
    lowdelay,  
    delaytolerant,  
    ...  
}
```

```
RNC-ID ::= INTEGER (0..4095)  
-- RNC-ID ::= BIT STRING (SIZE (12))  
-- Harmonized with RNSAP and NBAP definitions
```

```
RRC-Container ::= OCTET STRING
```

```
-- S
```

Lots of unaffected ASN1 in 9.3.4 not shown

END

9.3.6 Constant Definitions

```

-- *****
--
-- Constant definitions
--
-- *****

RANAP-Constants {
itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
umts-Access (20) modules (3) ranap (0) version1 (1) ranap-Constants (4) }

DEFINITIONS AUTOMATIC TAGS ::=

BEGIN

-- *****
--
-- Elementary Procedures
--
-- *****

id-RAB-Assignment                INTEGER ::= 0
id-Iu-Release                    INTEGER ::= 1

```

Lots of unaffected ASN1 in 9.3.6 not shown

```

id-RANAP-Relocation             INTEGER ::= 28
id-RAB-ModifyRequest           INTEGER ::= 29
id-LocationRelatedData         INTEGER ::= 30

-- *****
--
-- Extension constants
--
-- *****

maxPrivateIEs                  INTEGER ::= 65535
maxProtocolExtensions          INTEGER ::= 65535
maxProtocolIEs                 INTEGER ::= 65535

```

Lots of unaffected ASN1 in 9.3.6 not shown

```

id-RAB-ModifyList              INTEGER ::= 91
id-RAB-ModifyItem             INTEGER ::= 92
id-TypeOfError                 INTEGER ::= 93
id-BroadcastAssistanceDataDecipheringKeys INTEGER ::= 94
id-LocationRelatedDataRequestType INTEGER ::= 95

```

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END